SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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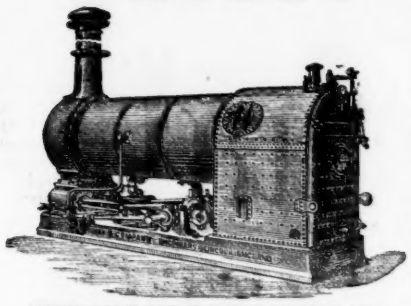

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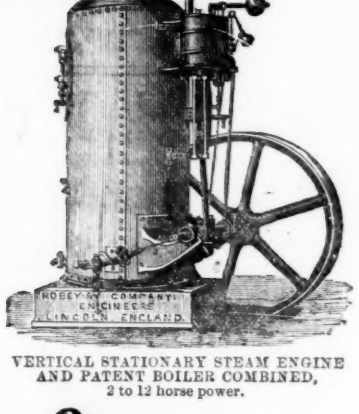

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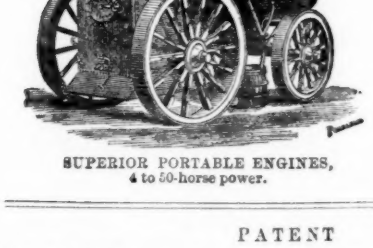

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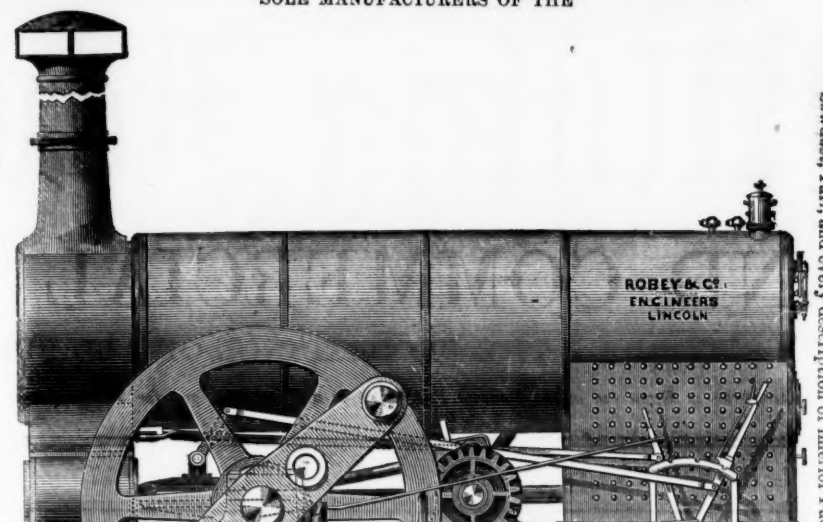

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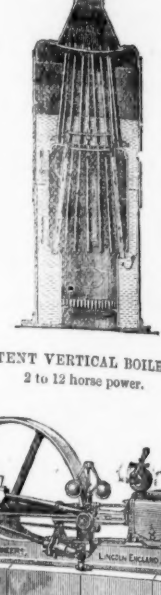

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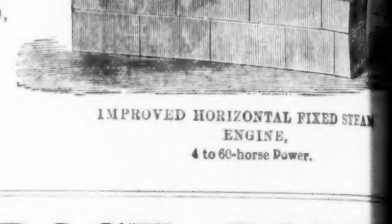

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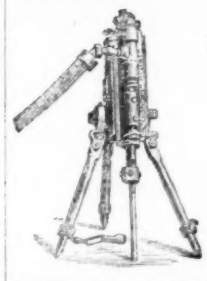

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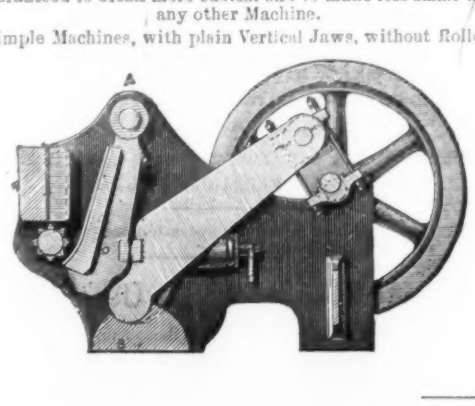

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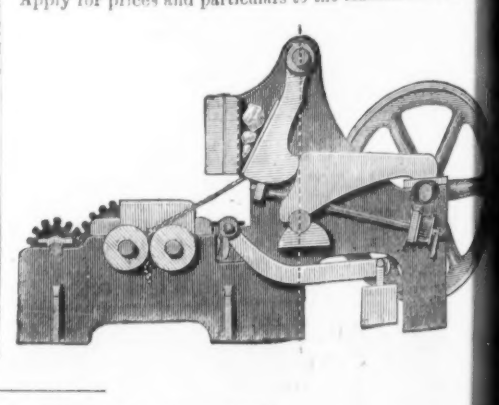

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Original Correspondence.

THE NEW QUEBRADA COMPANY.

SIR,—I am obliged by your courtesy in inserting my letter of the 8th inst., and am thereby emboldened to forward you the following further remarks:—

It was very satisfactory that 'A Shareholder" should have given such convincing proof of the value of the mines, afforded by the extracts given from letters of one of the managers of the Bolivian Association in 1839. Those extracts certainly go far to prove the value of the upper workings which in the diagrams attached to Mr. Darlington's report are marked "unavailable," without any definite reason being given for their being so. In the report it is stated that "the whole of the ore is extracted or rendered unavailable by the destruction of the openings;" but if the openings are destroyed, and have, therefore, not been found and explored, who can say that "the whole of the ore is extracted," or, if the whole of the ore is extracted what is there left to be unavailable?

In my last I ventured to suggest that the Aroa and Titiara lodes were one and the same, and, being anxious to find some supporting authority to my theory, I have since obtained an interesting work, written by Sir John Hawkshaw, in 1838, and find therein an account of the mines of Aroa, which fully supports all the subsequent statements of their value.

Sir John Hawkshaw says—"It is in the high and sharp ridge, between the Quebrada and the Titiara river, that the mines are situated, the lode or vein making its appearance in both ravines about equally in each case from the valley of Aroa. The Spaniards established workings both in the Titiara and the Quebrada side; but as their object was merely to obtain one species of ore—the ruby or grey copper ore—their workings were irregular and confined. All the copper ore which they raised was smelted at the mines, and carried away as a sort of coarse copper in cakes. The chief works of the Bolivar Association had been confined to the Quebrada Mine, in which the vein or lode is of great thickness, from 18 to 20 ft., and in some places of still larger dimensions. From its position on each side of the ridge there seems great probability that it extends right through, and that the Titera and Quebrada Mines are in the opposite ends of the same vein. The mines are not elevated more than 200 ft. above the level of the sea, and the ridge in which the lode is situated does not rise more than 200 or 300 ft. above the mine, though the country behind the mines continues rapidly to ascend. The great mass of the ore, so far as our workings extended, is a sulphate, composed entirely of copper, iron, and sulphur, with very little extraneous matter, malachite, red copper, native copper, and black oxide were all met with, but only in small quantities. Occasionally large quartz crystals were found, but excepting on the walls of the lode this earth, so troublesome and forming so large a portion of many copper ores, was not prevalent. Red copper, which is one of the richest ores, still remained in considerable quantities, even in the parts of the lode which the Spaniards had already searched for it. In general the mines were dry, the little water that made its appearance came by infiltration from above. The produce of the ore was as high as 60 per cent., the grey 30 to 45, the yellow 20 to 30—the average being about 30 per cent."

Sir John Hawkshaw also describes the mode of working the ore, and the means necessary for working them to advantage. On this point, he says—"A small railway from La Hacha to the sea would appear to be all that is requisite for working these mines to advantage." And, with regard to the extent of the operations carried on, we read—"Altogether about 200 English workmen were employed, and upwards of 1000 Creoles." "The wages of the Peons or native labourers, including the rations, averaged about 2s. 6d. per day, whilst the English workmen, of whom about 40 were miners, chiefly from Cornwall, received from 8*l.* to 12*l.* per month."

I think the above extracts go far to prove that if "Hypothetical and Extravagant Calculators" err, at all events, they err in good company; but amongst the remaining mass of evidence I cannot help asking you to reprint the following testimony by a practical man, who gives measurements which are in many instances verified by the diagrams issued with Mr. Darlington's report.

The Bolivar Railway Company with their prospectus issued a report by Capt. Matthew Francis, who for several years was employed by the Bolivar Association, and who writes of the Aroa Mine that the copper vein is very large; it is 90 ft. wide. The north or hanging wall of the lode, for 18 ft., is composed of grey sulphuret of copper, yielding 41 per cent., and now worth 28*l.* per ton; 72 ft., 80 fms. wide of the lode, resting upon the foot or south wall, is composed of the ore called yellow sulphuret of copper, worth 20*l.* per ton. I estimate the yield of the grey ore per lineal fathom at 2 tons, and the yellow at 200 tons—the grey ore being 18 ft. and the yellow 72 ft. wide. Santa Catalina level has passed into this ground for a length of 100 fathoms, and, as St. Simon is in ore 30 fms. above, it is fair to take the area of the discovered ore level at 3000 fms. on the face of the lode; and, as 1 fm. by this depth for the thickness of the lode is worth 9000*l.*, we may take the value of the ore discovered and unwatered by Santa Catalina level at 27,000,000*l.* sterling. At the Titiara Mine, about two miles west of the Aroa, I found cropping out at the surface of this lode the finest beautiful ruby copper ore (malleable) and malachite that can be imagined to form the back of a great copper formation in the richest of copper lodes. I am well acquainted with the *indicia* of copper deposits, and I unhesitatingly pronounce this to be one of the richest I have ever seen, and certainly a continuation of the copper lode at Aroa Mine. I will not venture to go into a calculation of the value of the ore ground existing between the mines of the Titiara and the Aroa; that such lines of metal do exist is evidenced by the runs of the great copper lodes from Camborne to Redruth, and by the lengths of the deposits on the Devon Great Consols lodes. I do not intend to assert that these masses of ore are continuous. I am aware that all lodes have their productive and unproductive mines; but if we take only one-fourth of the length of lode from Titiara to Aroa to be of equal yield with the Aroa this ore ground would then be worth more than 100,000,000*l.* sterling."

I have quoted this report not so much for the figures it contains as for its value as another practical opinion that the lode is continuous between the Aroa and the Titiara Mines, a distance given by Mr. Darlington as 2300 yards. I notice that Capt. Francis states that the Catalina level has been driven in ore for 100 fathoms;" but Mr. Darlington states that the Aroa Mine has been worked for a length of 350 ft.—say, 60 fms.—and I observe also that Capt. Francis speaks of a level called St. Simon as being in ore 30 fms. above Santa Catalina, but no mention is made of such level in Mr. Darlington's report or diagrams. This St. Simon level would be 54 feet above Carthew's, the highest shown in the Quebrada Company's diagrams, and is probably one of the levels referred to in the extracts quoted by "A Shareholder" in your last issue. We have, therefore, another testimony of the existence of ore remaining in the upper workings which are supposed to be "unavailable," although no effort seems to have been made to find the levels by which these rich ores were extracted in former times.

There are many points connected with the development of the mines owned by the New Quebrada Company to which I should like to refer; but I cannot ask you to fill up your valuable space with matters of detail more proper for discussion in the pages of a journal specially devoted to the subject than insertion in a journal that generously opens its columns to all comers. There are, however, two points to which I venture to claim attention, the first being the question of wages, and the second the timber on the company's estates.

I note that the company appear to be paying, according to Mr. Darlington's report, 6s. 6d. per day or shift for native Peons. Sir John Hawkshaw gives the rate as 2s. 6d. in his time; in mine—40 years ago—the rate was 8 to 10 Rs.—say 3s. 4d. to 4s. 2d., according to these figures wages have risen nearly 100 per cent. in the higher price was only given to exceptionally good men. Canada during the last 10 years; but I rather think this would require proof, and am sure that the rate might have been kept down to 4s. 2d., or a hard dollar, at which price there are few places in South America where we cannot either find labour on the spot or import it.

The other subject to which I wish to refer is that of the valuable timber growing on the company's estates, and about which nothing is said in any of the company's later reports. I have always understood that a vessel cannot be loaded up entirely with ore without a large space of the hold being unoccupied, and that, therefore, it is an advantage to have some lighter freight that can be placed between the storings of the ore. The New Quebrada Company's estate possesses such a freight in abundance and it is perfectly useless for anyone to argue that "timber," properly cut and selected in Venezuela, does not pay if sent to London, for the price currents of Puerto Cabello show that fustic and lignum vitæ are being sold there at prices that leave profits of 60 to 100 per cent. on the cost of cutting these woods on or near the company's property. Mahogany and cedar sell equally well, and the Puerto Cabello merchant buys these woods to export either to England or the Continent, and there is no valid reason why the New Quebrada Company should not augment its revenue from the mines with the sale of the timber now growing on its lands.

I am glad to see that the attention of the New Quebrada shareholders has by a correspondent of the Money Market Review been called to the question of amalgamation with the Bolivar Railway. On this point I may possibly ask you to grant me space on some future occasion.

E. D. MATHEWS, Assoc. Inst. C.E.

Mildmay Chambers, Union-court, Sept. 14.

THE FRONTINO (ANTIOQUIA) COMPANY.

SIR,—The Frontino Mine may be said to be suffering from a surfeit of riches. With so many valuable lodes there is great danger of Mr. White's fable of the monkey and raisins being illustrated here. In a short report to hand this morning from the mines, Mr. White says—"The Silencio Mine generally is in a splendid condition, and the mineral being brought to surface very fine. The Palmachala works are well forward, and the lode is richer than Silencio." It was only last week that I gave you extracts from some of the old reports of Mr. White's, from which, after very careful study, I drew the conclusion that the Palmachala would in time beat the Silencio. Any person interested in this mining property would read these reports with very great interest. I have no doubt they can be got at the office. I hope sincerely that Mr. White will not be trying at too much, but develope the proved ground thoroughly before going in for more discoveries. There can be no harm in showing the value of our property, but there is a great temptation to run the mine too hard. I do not fear this, as we have a very good manager in Mr. White. I am a very old shareholder in the company, and will wait patiently the development of this fine property. No great amount of Silencio ore can be brought into the July returns, as Mr. White's letter is dated July 12, in which he says—"That day he had brought up 3 tons," which we may suppose would be the first lot brought up. From the 12th to the 20th would be only a week's work.

OLD SHAREHOLDER.

QUEENSLAND MINING.

SIR,—Our tin fields are rapidly and steadily developing, as the enclosed clips will show. Their permanency is now proved beyond a doubt, and the present low prices ruling has not so far affected supply. The Government of Queensland starts working the Stanthorpe Railway at once. This will give our tin miners another advantage of at least 5*l.* per ton in the cost of production, as it will make the necessaries of life so much less at the fields. The Chinese are going on the field in thousands, and they will be able to produce stream tin at half what it costs with British labour.

Brisbane, June 30. RESIDENT.

The ground known as the Old Pioneer Company's Mine, situated on the lower portion of Ruby Creek, and considered to have been worked out some two years since, has for some time past been yielding fair returns to the present holders, Robertson and party. The party consists of four men, who, we are informed, are making good wages, notwithstanding the scarcity of water, and it is intended to employ a couple more hands in a few days time.

The Phœnix Mine, embracing an immense area of Ruby Creek, the greater portion of which has remained comparatively untried, employs some two or three parties, with, we are informed, very fair results. On the block immediately above the road (the property of Mr. T. Bruce and party) a large number of Chinese have been working continuously for a considerable time past on tribute, and doing very well. Several Europeans recently set in on tribute in the same mine, and, we are informed, are making fair wages.

Radcliffe and party's claim of 40 acres, adjoining the Maryland Ruby, higher up the creek, let on tribute to a party of Chinese, is said to have turned out well at a recent washing up of the accumulated dirt, and the prospects of the mine to continue equally good.

Our Vegetable Creek correspondent writes as follows respecting the discovery of a rich tin lode in that district:—There is a big sensation on the creek just now over a recently-discovered tin lode. Its position is about 23 miles north-west of Vegetable Creek, and about 5 miles from Maidenhead Station. The country there goes by the name of "The Gulf," and in olden days was one of the haunts of the renowned "Thunderbolt." The reef has been worked to a depth of about 30 ft., where it has a width of between 6 and 7 ft., and is widening, as they go down, about 2 in. in 1 ft. The stone is simply magnificent, being very nearly pure tin, and full of crystals. One piece which I saw was about the size of an ordinary bag of tin, and weighed considerably over 1 cwt. Ten men, who have been working it in a very primitive way, have been raising about 10 tons a week. The reef runs about south by east. It is supposed by one of the managers that with proper machinery about 100 tons of clean tin may be the weekly return. There are four different parties claiming the ground, the principal being the Gulf Steam Tin Mining Company. On Saturday night ten men were in the Vegetable Creek lock-up, through refusing to give up possession of the ground and about 30 tons of tin, and resisting the police. The affair is another Government muddle, and there is at present every prospect of a big lawsuit down in Sydney. The question of a payable tin reef is now settled as far as this district is concerned, and I suppose a township at the Gulf will very soon be established. The formation where the reef is situated is a mixture of granite and trap. Special constables have been sworn in to protect the ground. About 20 wages men are working on it for the company at 10s. a day. Water is still badly wanted on Vegetable, in consequence of which there are a good many men out of work.—*Stannum Miner.*

SILVER MINING IN SAN JUAN, COLORADO.

SIR,—Since my last to you I have spent ten days in the Mount Sneffels district, examined all the lodes on which any work had been done, and not only that, but obtained by right of discovery and location three very good lodes of my own, and finished my assessment work on one of them. When a man discovers a lode here he has first to stick up his location stake, setting forth that he John Smith claims that lode, 1500 ft. in length, by 300 ft. in width, running in such a direction with all its dips, spurs, and angles, &c. The law then gives him 60 days to do a $100 worth of work on it, and 30 days more to record his claim at the office of the recorder of the district. It is then absolutely his own until a year has expired, when, if he has not been developing it in the meantime, he has to do another $100 worth of work; if he fail to do the work on it his claim is liable to be "jumped" by another man, but this is rather a dangerous business, and not often attempted.

The Statute provides that $100 worth of work shall be done. The State law construes this to mean a shaft 10 ft. deep, or if a drift, a 10 ft. face on the vein. So now you can easily understand how easy it is for a lot of lazy shiftless men to overrun the country, stake out claims, and instead of working them and getting out the ore, go back and dispose of their claims for a few hundred dollars in the winter, and then next spring go off into the hills and find more. True, it is, however, that in many districts the claims are held by hard working men who would take out the ore were there any market for it, and any works to treat it. Sneffels is exactly in this condition, so the owners just manage to come here and do their assessment work each year until the erection of works near by will enable them to take out their ore. I visited the Wheel of Fortune Mine, 2 miles from my camp, two days since; this is the only developed mine in the district, and the owners have been sending their ore on pack animals to Lake City (37 miles), to be treated at a cost to them, as the owners told me, of $45 per ton freight, $15 per ton for mining, and a profit of about $40 per ton to the mill-owner. The average run of all the ore sent to the mill has been about 210 ozs. silver to the ton, and they have lying in their dump 100 tons of 100-oz. ore, which it will not pay to ship. This will give you some idea of the need of works in the viciniey, there are a hundred lodes in the Sneffels district which show quite as well on top as the Wheel of Fortune, but where, for want of smelt mills and chlorination works, 100-oz. ore is called low grade, it will be readily understood why they are not developed. The lodes in the Sneffels district are in trachite and porphyry rock, and most of them quartz, carrying grey copper and brittle and ruby silver; there are also some very large galena veins, varying in width from 2 to 10 ft. The Wheel of Fortune vein is 20 in. in width, quartz, carrying brittle, ruby, and native silver; the drifts are on the vein, and they took out pay ore at the first blast. A speculative drift is unknown here, such as there are have been made on the veins, and the speculative piracy which would lead men to tunnel to cut well-known veins owned on the surface by others would not be tolerated. I can stand in the Imogene Basin, Sneffels districts, and point out from one spot 10 veins running over the mountains. One of them of 5 ft. in width, quartz carrying galena, copper pyrites, and grey copper, is traceable for 2½ miles, and there are nine claims on it of 1500 feet each. A load of ore is just about to start from here, and the man in charge of the train is waiting to take this to Ouray for me, so I must close in a hurry. More anon.

W. WESTON.

Richmond Gulch, Imogene Basin, Aug. 21.

A NEW RAILWAY ERA—LOCOMOTIVE AND COASTING SCREW-COLLIER SUPERSEDED.

REVIVAL OF THE IRON TRADE, THROUGH THE DEMAND FOR BRIDGE-WORK FOR UNDULATING RAILWAY.

SIR,—The marvellous progress of the last two generations should make anyone cautious of predicting the future. "Greater works than any yet achieved remain to be accomplished," such are the words of the eminent railway engineer, Sir John Hawkshaw, in his opening speech as President of the British Association Bristol meeting, August, 1875, in his exordiums of the railway system. "Our present knowledge," Sir John continues, "compared to what is unknown even in physics (the basis of my system of railway transit) is infinitessimal." We may never discover a new force, yet who can tell? We can, and no doubt shall, greatly improve the application of those with which we are acquainted. He recalled the time when an able member of that Association declared that no steamer would ever cross the Atlantic. Yet soon after that statement was made the writer, composing one of the audience, but decidedly understanding it in a commercial sense, as shown by the writer's subsequent correspondence in the Shipping Gazette. The Sirius steamed from Bristol to New York in 17 days, followed by the Great Western, which made the homeward passage in 13¼ days, since performed to Liverpool in 8 days 7¾ hours by the City of Berlin. Who is not conversant with the retarding influence Lord Dundas encountered with the introduction of the first really practical steamboat, constructed with the view of using it in the Forth and Clyde Canal? Another attempt to make a practical use of steam as a motive power for boats failed through the death of the Duke of Bridgewater, who had determined to introduce steamboats on the canal which bears his name.

Since the writer first travelled on the Stockton and Darlington Railway by horse-traction in the then early period of railway passenger traffic, and since George Stephenson inaugurated in 1830, on the Liverpool and Manchester Railway, a social revolution, the railway system, by the latest Board of Trade Returns, has risen in the United Kingdom to 16,658 miles, and in British possessions to 13,547¼ miles. Sir Henry Tyler's General Report on the Working of the Railways of the United Kingdom shows that passenger traffic is mulcted with minimum threefold the amount for transport of equal weight of merchandise traffic. The net return on capital invested, which was in 1858 3¾ per cent., was with an immensely increasing traffic no higher than 4·14 per cent. in 1874.

In his opening speech as president of the Institution of Civil Engineers, in January, 1876, Mr. G. R. Stephenson called attention to the fact that increased accommodation for the heavy traffic, or duplication of our railways, was becoming indispensable, corroborated by Sir Henry Tyler in his precited report. With the fact before us that third class passengers are conveyed by the South Indian Railway Company under one farthing per mile, second class considerably under one halfpenny, and first class less than one penny, the moment has arrived to attain lower rates in the United Kingdom. Railway magnates and officials may refer to the decision of the Committee of the House of Commons in the Great Eastern Northern Junction Railway Bill, which does not hold good in the present case, as we shall carry with us the whole country (large railway stockholders, high functionaries, and locomotive builders excepted) in a compact, irresistible, and invincible phalanx. It is well known that it was a purely mechanical genius which inspired Richard Trevithick to construct the first locomotive in 1802, its improvement and working being reserved for George Stephenson in 1814—a purely mechanical mind, by no means schooled by a higher class of professional education. A report to Parliament from Commissioners appointed to enquire into the application of iron to railway structures in 1849, states—There is a great want of uniformity in practice in many most important matters relating to railway engineering, showing how imperfect and deficient it is in leading principles. Engineers had scarcely breathing time, on account of the extent and number of new railways, to observe and profit by the experience of each successive new line. The thirst after gain in the present generation, the age of materialism, self-worship, and aggrandisement—in very truth the era surpassing all others in idolatry of wealth—impelled the late York silk mercer and other *novos homines* to take advantage of their position, and amass eminence and fortunes as if by enchantment, so that if we take a retrospective view of the railway epoch we shall not have much difficulty in discovering a system of gambling unexampled in any age or country.

The City Article of the Times of June 5, 1871, with reference to management of railways in present times, shows the Midland and Great Northern contest was carried on at a great loss of revenue, at the enormous rate of 300,000*l.* per annum. The general investing public have launched their capital into existing mechanical systems of railways, in perfect ignorance of the actual state of working railway traffic. The Edinburgh Review, April, 1876, states no railway proprietor can tell what is being done with his property. How common to hear, until recently, when their eyes have been opened to the awful collapse of Russia under the existing Government, the worst on the face of the earth the unfortunate holders of Russian securities exclaim. But look at Russia's railway assets! The printed report of the directors of the leading Russian railway—St. Petersburgh to Warsaw—shows 92 per cent. working expenses, Odessa line 98 per cent., Revel line 88 per cent., Tambow-Koslow line 122 per cent., Novotorjok line 144 per cent., the bankrupt Hango line, fruitlessly put up for sale, and still worse cases. In France, M. de Franqueville, Ministry of Public Works, shows that of 16,296 kilometres 10,969 kilos. do not carry traffic sufficient to pay for the expense of working and interest of capital; 1296 kilometres do not cover the mere working expenses. M. de Franqueville does not pass over in silence the purchase in this country of 1716 miles of inland navigation by the railway companies out of 4135 miles, and the payment of 40,000*l.* a-year to a canal company by way of bribe to assimilate and keep up the rates. The New York Chamber of Commerce report of Feb. 25, 1875, shows that railway transport cannot compete with water transit, and the annual report of the State Comptroller, U.S., January, 1875, is to the same effect, to which we may append incontrovertible similar data from France, Germany, &c. Russian bondholders were given to understand by the publication (Deacon and Co., Leadenhall-street) of a pamphlet, "The Insolvency of Russia and of Russian Railways," by a functionary 25 years attached to the Russian Ministry of Finance, that they had launched their capital into securities of a state styled by a leading London daily newspaper, in September, 1877, "a hollow sham," and they will too late discover the awful abyss of misery they have plunged into. Those financially interested in existing railways of this country will do well to take timely warning of a brewing storm which will annihilate the vast fabric of 6,000,000*l.* to 7,000,000*l.* sterling.

The existing railways of Great Britain are destined to become what the omnibuses are to them—mere feeders of the new system of trunk lines through their branch lines. By the latest Board of Trade Returns no interest has been paid on 35,678,393*l.* of ordinary

stock, 7,667,081*l.* of preference stock, 48,000*l.* of loans, and 769,464 of debenture stock. A much larger amount was paid for personal injury (381,038*l.*) than in any previous year, and equally so with damage to goods (278,917*l.*), exclusive of repairs to the rolling stock, &c., caused by these terrific accidents of so frequent occurrence. The electric telegraph was regarded in the first instance as a mere scientific idea. At this moment upwards of 400,000 miles of telegraph are in different parts of the globe. Frederick the Great exclaimed "Das Unbewusste das nicht von uns Gewollte ist weit stärker als unser bewusster Wille, und doch war er ein Weld und ein Mann von dem machtig sten Willen." La Place, although knowing more of the celestial mechanism than any man, said earnestly on his death bed "That which we know is little; that which we know not is immense;" which spirit was partaken of by Newton in the very flush of his immortal discovery, when with the modesty of all great minds, beside whose infinite aspirations the highest positive attainment is ever insignificant, he is recorded to have spoken thus —"I am but as a child standing on the shore of the vast and unexplored ocean, playing with a little pebble which the waters have washed to my feet." "Chamber's Encylopædia," 1862, states—"It would be unphilosophical to conclude that perpetual motion is absolutely impossible. It cannot be attained by any mechanical arrangement, and neither heat, light, nor magnetism can assist us. Attempts are mostly all based on application of mechanics." Dr. Hooke, in 1866, remarked—"Gravity, though it seems to be one of the most universal active principles in the world, and consequently ought to be the most considerable, yet has had the ill fate to have been always till of late esteemed otherwise, even to slight and neglect." "How much," says Sir John Herschell, "is escaping us. How unworthy is it in those who call themselves philosophers to allow these grand phenomena of Nature, these majestic manifestations of the power and glory of God, to glide by unnoticed and drop out of memory beyond reach of recovery." To meet the feelings which will be elicited, as logic is the science of the operations of the understanding, which are subservient to the estimation of evidence, I shall marshall the facts I am engaged in elucidating, so as to enable the public to perceive more clearly what evidence there is, and to judge with fewer chances of error whether it be sufficient. In the vast heavens, as well as among phenomena around us, all things are in a state of change and progress—change rising above change, cycle growing out of cycle in majestic procession proclaiming the infinite greatness and unsearchable plan of an Almighty Being, at whose bidding these phanthasms come from nothingness, and in their turn disappear. In approaching the subject matter of an undulating railway capable of attaining the desideratum, or rather *sine qua non*, of a high velocity with perfect immunity from those terrific disasters so frequent in and inseparable from existing systems, it is not undeserving of recalling to mind that the earth revolves in its elliptical orbit 68,040 miles per hour. Light propagates itself by undulations about 192,000 miles per second, electric light traversing 288,000 miles in the same period of time, and hydro-galvanic current 18,700 miles per second. The atmosphere is propogated by undulations. Cross the Atlantic and behold its surface covered by huge unbroken billows, the height of the undulations, the contour of the waves being cycloidal arcs, the great vertical distance from the crest to the bottom of the trough and the breadth. The motion of the tide-wave is undulating. Nature presents to us in gravity a most important power, the "Mechanics' Magazine," vol. 25, 1836, showing the late Sir John Rennie, in his descending planes, attained a velocity at the rate of 720 miles an hour. Before science raised the veil from the distant, we knew gravitation only in the fact of the fall of a stone, or in the roundnes of a drop of water.

Following it through the complex motions of the moon, through the entire order of the entire system, we find gravitation pursuing the comets through the abysses, governing the orbits of the double and triple stars, guiding the sun in his path through the skies, and even those stupendous evolutions of firmanents during which the stars congregate into dazzling clusters or arrange themselves in galaxies. Boundless is the sphere of this force. The endless progression of knowledge, and the clearer understanding of the works of creation which the mind of man is seen to be capable of, causing the past and future, the near and remote, to be within its grasp, and while the infinite works of the Creator can never be exhausted by his creature, it is a delightful thought to the intelligent mind that around all the ages of the future to which the hopes of the Christian extend his mind shall ever be expanding amid new and fuller disclosures of the wisdom, greatness, power, and infinite goodness of Him who removeth mountains, and they know not who overturneth them in his anger, who shaketh the world out of its place, and the pillars thereof tremble, who commandeth the sun and it riseth not, and sealeth up the stars; who alone spreadeth out the heavens and treadeth upon the waves of the sea. The system proposed is the formation of a railway with a series of undulating planes, ellipses, or epycycloids, by force of gravity and special arrangement (W. J. Thompson's patent) attaining a high velocity, with perfect immunity from disasters of any description, enabling passengers and goods traffic to be carried, including a 10 per cent. dividend, at less than a quarter of existing rates, and under one-fourth of the time consumed by the locomotive system. One feature of great importance in the undertaking has been most favourably reported upon by the Government Railway Inspector The system has been personally submitted to two leading Government professors of physics, men of European celebrity in the science, who state that the matter is in every sense practical.

The most subtle opponents of any improvement upon existing railways may allege that only 80 per cent. of the ascending plane can be surmounted, auxiliary power being requisite to overcome the remaining 20 per cent. With a pessimist view in ignorance of the system, although even such does not debar its execution without steam-power, the velocity attained is so great as to overcome all friction in consonance with the dicta of the most eminent authorities. The entire railway world is occupied in this country with the application of the most practical brake, which we reject, being a scientific and by no means a mechanical system. But we do not require to go further than aforesaid Government report, which, although carried out simply to ascertain the action which takes place in iron railway bridges by loads passing over same with a high velocity, and under varying circumstances, fully proves my case in combination with a special undulating trajectory which alone renders it possible to obtain the high velocity quite impossible with the locomotive, mechanically or scientifically. The most elaborate evidence, direct or indirect, can be adduced in its favour from Newton, Bacon, Huygens, S. Gravesande, Tycho, Brahe, Galileo, Copernicus, Kepler, Bernouilli, Clairaut, La Place, Muschenbrock, Hooke, Pascal d'Alembert, Bossut, Coulomb *v.* Humboldt, Lardner, Nicholas Wood, Whewell, Playfair, Olmstead, Gillespie, J. Scott Russell, Flamstead, Hallay Maclaurin, Airy, Pambour, without impinging the more remote periods of Apollonius, Thales, Ptolome, Pythagoras, Aristotle, Archimedes.

The gravitation system of railway will enable infinitely greater loads to be carried than upon existing railways, doing away with the immense dead weight, which acts as a heavy drag upon the earnings of the present system, by no means matters of hypothesis but irrefragable facts. The carriages will possess an equable motion, free from jerks and oscillations, replete with every comfort and convenience not existing in this country, so that a passenger need not quit the carriage from leaving Edinburgh until his arrival in London, the velocity enabling a man of business to leave Glasgow in the morning, and have the benefit of the entire business day in London, arriving in Glasgow on his return in the early evening. As to the transit of coal to the Metropolis a great saving will be effected on the cost of freight per the screw collier, and the coal will be delivered in much better condition.

The writer, in the interest of progress, invites the co-operation of capitalists, at whose absolute disposal he places the most irrefragable data as to the practicability and soundness of the undertaking, accompanied by the very highest testimonials from the largest railway contractors in the world. Railway and governmental authorities in favour of his attainments in the branch of railway transit, to which he has devoted many years study and travel all over Europe, favoured by being conversant with the various European idioms.

WILLIAM JOSEPH THOMPSON.

20, *Little Tower-street, and Clapham, Sept.* 19.

GUNPOWDER AND DYNAMITE.

SIR,—During the luncheon which was given after the recent interesting and instructive experiments with dynamite made by Messrs. Nobel at Aberystwith, a mining captain rose and asked someone present to state why dynamite was such a much more powerful blasting agent than gunpowder. No one did so, probably because the request was not couched in very polite terms.

In this letter I will endeavour to give a brief history of the two explosives; then to explain the chemical composition of each; and, lastly, the physical reasons of the great difference of the dynamic force of the two explosives.

The earlier history of gunpowder, like every old invention, appears to be wrapped in mystery. It was probably invented in the 13th century. Gunpowder is mentioned by Albertus Magnus and Roger Bacon, who both flourished in that century. Some, among them the learned Prof. Beckmann, suppose the invention to have sprung from India, others give the Chinese the credit of it. It is difficult to say whether gunpowder was first applied in military or mining operations. We learn from Lord Bacon's "Novum Organum," that in the 16th century gunpowder was employed for blasting huge masses of rock; but it was used in military operations long before this. After its ingredients were pounded and sorted separately they were formerly then ground together under ordinary Cornish stamps, turned by a water-wheel. In the Abbé La Pluche's "Spectacle de la Nature," 1762, there are two folding plates showing the kind of stamps used. Now, however, it is found better to grind the ingredients beneath edge-stones revolving on a circular bed.

Dynamite is a very recent invention. In 1847 Sobrero discovered an organic compound afterwards called nitroglycerine or glonoin. Soon after its discovery nitroglycerine was used as a blasting material. From its highly dangerous nature, and from the serious accidents it gave rise to, an Act of Parliament was passed hampering and restricting the use of nitroglycerine to such an extent that it will probably never be used in mines again. Nobel afterwards discovered that where nitroglycerine was absorbed by a kind of silicious earth called "kieselguter" or rottenstone, it was a comparatively safe explosive. Since then other absorbent materials have been proposed, the most notable among them being a specially prepared kind of charcoal. This new form of dynamite is termed "sebastin," and is the invention of Mr. Gustaf Fahnehjehn, of Stockholm. Its dynamic force is said to be even greater than that of dynamite.

Having thus briefly traced the history of the two explosives, I will pass on to their respective compositions. Everyone knows that gunpowder is a mechanical mixture; it consists of sulphur, charcoal, and saltpetre, or nitre of potash. In ordinary gunpowder there are about three parts of charcoal, and one each of sulphur and nitrate. The sulphur is only mediately connected with the explosion. By the sulphur igniting at a low temperature heat is supplied to assist in the combination of the nitre and carbon, and in the expansion of the gases formed by their combination, the sulphur itself turning into sulphurous anhydride; thus also increasing the total quantity of the gases given off during the explosion. The carbon of the charcoal combines with the oxygen of the nitre, and forms carbonic anhydride, setting free the nitrogen of the saltpetre, and leaving sulphide of potassium behind. These reactions would occur if the ingredients employed were pure, but in realty they are never so, and practically the result is much more complicated. So it may be said that three gases are formed by the explosion of gunpowder.

Nitroglycerine is produced by the action of nitric and sulphurous acids on glycerine; it is composed of carbon, hydrogen, nitrogen, and oxygen, in certain proportions. On explosion four gases—nitrogen, carbonic anhydride, steam, and oxygen, are formed.

Lastly, let us look at the physical reasons why dynamite is such a much more powerful dynamic agent than gunpowder. In gunpowder the explosion does not take place simultaneously, but passes from particle to particle. On the contrary, nitroglycerine explodes, as far as we can judge, simultaneously, or in the same instant of time. The reason is obvious, one is a mechanical mixture, the other a chemical compound. The oxygen necessary for the formation of carbonic anhydride is tied down, as it were, in the nitre, and the particles of carbon and nitre are, comparatively speaking, wide apart. In the nitroglycerine compound all the elements are held together by chemical bonds and compared with such a compound as saltpetre, loosely held together. Such an agent as heat is wanted only to give rise to re-combinations.

I take it, then, that the reasons why gunpowder is inferior to dynamite as an explosive are as follows:—

1.—Gunpowder being a mixture time comes in as an element in its entire explosion. Though the sulphur in the long run assists the explosion, yet it must still further prevent the particles of charcoal from coming in contact with the particles of nitre.

2.—Gunpowder in its explosion produces a much less volume of gas than dynamite.

3.—Gunpowder in its explosion produces less heat than dynamite, and consequently less expansion of the gases already formed.

The volume of gas produced by the explosion of a given bulk of gunpowder is said to be 300 times greater than that bulk at the ordinary temperature, but the heat produced by the explosion expands the volume to a still five times greater amount.

I am not aware that the volume of the gases produced by the explosion of dynamite has been measured. We must remember that the volume would be less by one-fourth than that produced by the concussion of pure nitroglycerine, as dynamite contains only 75 per cent. of that compound.

When we reflect what an old friend gunpowder has been to us, a friend of many centuries standing, what wonder that it still has such a powerful hand upon us, and that dynamite, a brother but lately born, makes but small progress in our affections?

E. HALSE.

CRUSHING ORES.

SIR,—It is curious to notice what impracticable contrivances inventors design through insufficient study of the mechanical principles involved in the machines they have attempted to improve upon. It has often been remarked that the original specification in this country of the celebrated Blake's Stone-Breaker described an invention which was absolutely worthless, because the fulcrum of the moveable jaw was at the bottom instead of the top: whether this is true I leave some of those interested to explain, as it can scarcely be supposed that in so long a litigation as that which took place upon the patent this escaped detection, as it would have at once upset the patent. A German residing at Obercassel has, however, now patented, or re-patented, a new stone-breaker, the leading feature of which is that the fulcrum is at the bottom of the moveable jaw. According to Mr. Friedrich Schiffner's invention a strong lever or jaw is mounted at its lower end on a fulcrum between two inclined cheeks, the upper end of the jaw having a rocking motion of limited extent imparted to it, so as to cause it alternately to approach and recede from each of the cheeks in succession. The spaces between the jaw and the cheeks being made to taper or decrease in width towards the lower end, at which point only a narrow space intervenes between the two, any hard substance placed in such spaces will, by the rocking motion of the jaw acting with considerable leverage and power be crushed as it descends, and will fall through the narrow openings at the lower end, either in the form of very small pieces, or in a pulverulent form, according to the size of the said openings, which are adjustable, as will be presently described.

The jaw and inclined sheets are confined at the sides by strong side plates forming a framing, which carries at the lower end a strong pin, on which the jaw is pivotted, and at the upper end a driving shaft passing through the upper end of the jaw, and having an eccentric, which imparts the required limited motion to the jaw; or the driving shaft might be mounted at one side of the framing, and the motion of its eccentric or crank be imparted to the jaw by means of a connecting rod. The upper ends of the inclined cheeks are also pivotted on strong transverse bolts carried by the fra[me] while the lower ends rest upon wedge-shaped sliding block[s] can be moved by adjusting screws nearer to or farther away the lower end of the rocking jaw, thus moving the lower e[nd] the cheeks in a corresponding manner, and thereby regulati[ng] width of the openings between the cheeks and the jaw. If req[uired] an elastic packing may be placed between the surfaces of the ends of the cheek and the regulating blocks which support th[em] that the cheeks can yield somewhat to any excessive strain by the presence of a piece of iron or other material that resi[sts] crushing action. The acting faces of the jaw and the cheeks be provided with removable plates of steel or iron that can newed in case of their being injured. The acting surfaces jaw and cheeks may be either plane or curved surfaces, an[d] may be made either smooth or formed with teeth or other jections. The rocking jaw may be made adjustable vertical trunnions being carried in adjustable supports, in which ca[se] eccentric that imparts motion thereto would work in a blo[ck] justable in a slotted hole in the upper end of the jaw.

Now, it requires but little knowledge of stone-breaking [or] crushing to know that if the top end of the movable jaw mo[ved] a greater speed than the lower (which it must do when the fu[l]c is at the bottom), the lower end of the crushing hopper wi[ll] clear fast enough to receive the stuff partially crushed at th[e] and there will be a great loss of power as compared with a cr[ush] having the fulcrum at the top.—*Newcastle, Sept.* 18. A.

NEW APPLICATION FOR BARYTA.

SIR,—It has hitherto been complained that there has b[een] very limited market for baryta, as the mineral has only valuable for the purpose of fraud, its chief application bei[ng] the adulteration of white lead; but it seems that a more l[u]cr mate use has now been found for it, since Mr. William H[ow] of Sheffield, has discovered that the addition of it with other substance to iron, steel, and metals (the admixture made with the molten metal whilst in the furnace) tends to g[reat] improve the quality. The ingredients which he employs pulverised charcoal, Spanish and English baryta, pulverised scoured with acids for the removal of the dirt and impurities acid preferred being vitriol and acids of a similar kind, and this cleansing process the baryta is calcined and pulverised. Bu[t] blood, which last is calcined or dried by heat and pulverised the compound is to be used in a powdered state, but when the pound is to be used as a liquid or in a moist state the bu[t] blood is not dried, but the powdered charcoal and baryta are therewith, and the whole is made more or less liquid by preferably distilled.

The proportions which Mr. Drake finds most useful for g[eneral] purposes is one-fourth part each by weight of charcoal and bu[t] blood to one part of baryta, but these proportions vary som[e] according to the metal to be treated; thus, although the com[pound] is well proportioned for iron or steel, for treating copper the pound employed would consist of baryta principally, a quantity of charcoal, and but a little calcined bullock's blo[od] the varying proportions for the varying qualities of the met[al] be decided by testing.

When the compound is employed in a liquid state it is p[ut] or injected into the furnace at about the time when the metal mences to melt, and when used as a powder it is thrown in melted metal from time to time, as experience will decide. F[or] treatment of a charge of iron or steel in its melted state in th[e] dling-furnace or the cupola, he adds 1½ lb. of the compound t[o] hundredweight of metal, the said compound being used eith[er] or moist. For welding cast or Bessemer steel and welding rally, a small quantity of the powdered compound is place[d] or between the parts to be joined, and exercises a very s[pe]c geous effect in facilitating the weld.

Of course I have not as yet had an opportunity of seeing t[he] plication of this new iron physic on a large scale, but I und[er]st that the trials which the inventor has made on a small sca[le] been eminently satisfactory.—*Leeds, Sept.* 17. H. J.

OUR HOME MINING.

SIR,—The "science of investment" can prove of no practi[cal] unless through study it becomes searching, and when so a[p]p earnest and grasping in its scope. The one industry next t[o] culture is unquestionably that of mining. Shipping, rail canals, gas, manufacture, and thousands of varied ramificatio[ns] multiplied channels of our trade and commerce are closely with the prosperity and progress of our mining interests. T[he] vancement and success of our colonies are, no less than the M[ine] Country, dependent on their products of minerals and met[als] witness the vast stores of gold, copper, and tin from Australi[a] Zealand, Canada, and the Cape, which possess brilliants, dia[mo]nds rubies, and other precious stones in addition.

Just six months ago West Chiverton shares sold at 20*l.* e[ach] 60,000*l.* for the entirety. The market value now is 50 per c[ent.] Leadhills shares were at the same time 8*l.* each, against 5[*l.*] to a decline of 57,500*l.*, yet the directors state that there was les[s] when they visited the mine, from 16,000*l.* to 17,000*l.* worth of lead and lead ores dressed and in the crude state lying up[on] surface unsold, while the workings were so extremely produ[ctive] to enable the local staff to raise the monthly yield to 500 t[ons] even more if required. Van, in March last, sold at 37*l.* against 30*l.* now—a decline of 112,500*l.* Roman Gravel's in[ter]ests sold at 14*l.*, against 9*l.* to day—a falling off of 60,000*l.* Again[st] kerville, a few weeks since, were quoted 9*l.* 10s., against 6*l.* t[o] just 42,000*l.* decline. These adverse fluctuations in the c[ha]racter mining properties recognised by dealers on the London Sto[ck] change denote a total absence of demand on the part of the ing public, and a superabundance of shares in the hands of lative jobbers. These are also some of the anomalies of the and advantage should be taken by the student of the "sci[ence] investment" of the all but universal depression of prices.

There can be no doubt that the future of lead mining i[n] country is advancing in a marked degree, so far as produc[tion] foreshadow success. The discoveries made at the Cambrian the most substantial and brilliant character, while the local m[ine] is a miner of rare experience and capacity. Again, the ex[pert] in London aid him fully in carrying out his system of a pr[ompt] effective, and rapid development of the various rich and pr[o]ductive pioneer points now in course of realisation. Again, Tyn-y-f[ron] prospectively safe investment at par, 1*l.* paid up; there is a of blende or zinc ore laid open for fully 70 to 80 fathoms in containing a strong mixture of lead throughout. Bodidris l[ode] is a promising lead mine; and Llanarch, in Carnarvonshire, need only practical handling to become a success.

It is to Yorkshire that we must look for several early a[nd] stantial prizes during the current and succeeding years. T[he] is very compact and pure when broken from the lodes, and merly Cock Hill and Sunnyside, has been at work, with periods of intermission, for upwards of 500 years, but until sent company purchased the mines operations were restricte[d] entirely to adit or day levels. There are upwards of 30 lodes k[nown] exist extensively wrought on the backs, and wholly underl[ie] depth. This mine cannot well fail to become a great success. Craven Moor and East Craven Moor, with West Pateley Brid[ge] in the same district, and are unquestionably rich in lead o[re] quiring only time and practical handling to become prope[r] more than ordinary calibre.

It is with regret we refer to our oft repeated cautions, three years ago, of the certain collapse of most of the tin m[ines] Cornwall, and we must now refer to them again only to jus[tify] predictions. We cannot even regard Tincroft, Carn Brea, coath as properties of growing wealth in the future, while p[ar]ts Wheal Eliza and South Carn Brea are alone worthy the atte[n]tion investors. There can be no doubt of the vast products of Australia, and already some 1200 Chinese are employed stream works. There is also a combined organisation of cap[ital]

import some 10,000 others from the same country. Hence Cornwall will soon have to contend with cheap labour at the Antipodes, and people should at once and for ever disabuse their minds of any thing off in the foreign supply. Nor is it for the interests of the other Country to desire this growing supply diminished, for cheap means growing wealth to our manufactures, and more remunerative competition in the supply of goods to the mart of the world. this instance free trade has inflicted an injury on Cornwall, but far greater boon is conferred on the industrial interests of the and the domestic culinary requirements of the community. coasts and waters of Cornwall abound in fish, and the land is of the fairest and the soil the most fruitful in England, while stries of every kind are open to its hardy, thrifty, and intelual inhabitants. Why, therefore, should the collapse of tin ing depress their spirits or cripple their energies—their enterwill achieve success in any other department of our home inries, while their kinsfolk and countrymen have realised a profitproduct in Australia.

R. TREDINNICK,
Consulting and Advising Mining Engineer.

Exchange, 66, Coleman-street, London, E.C.

WEST CHIVERTON MINE.

SIR,—I have been somewhat puzzled at the various quotations these shares in the daily papers of late, having seen them quoted en one day and up again the next, and no business marked in the ious share lists. I have tried to buy, but without success, even 1*l.* 10*s.* per share when they were quoted 9½ to 11½. In the k Exchange list of the 18th inst. I found them quoted 8 to 10. ly there must be something wrong when I could not buy at 11*l.* ulate. Can it be possible that false quotations are put in for a purpose? Again, in the same list of the 19th inst. they are ted 9½ to 11½, and I could not obtain shares at 11½, in fact, was informed there was not a single share for sale upon the ket. I am aware they have lost 3000*l.* this year through failures the smelting trade, hence the loss of dividends. I am also aware low price of minerals has made an immense difference to them last four months, but I cannot comprehend the reason why the es are quoted down upon the Stock Exchange without just e. Perhaps some of your readers may be able to explain.

London, Sept. 20. A SHAREHOLDER.

SOUTH CONDURROW MINING COMPANY.

SIR,—Holding some shares in the above mine, I have duly received statement of accounts, accompanied by a cheque for the amount my dividend. It must be very gratifying to the shareholders to amidst the depressed state of the metal market and low price such good results, and the managers one and all deserve the nks of the shareholders for such, and I hereby tender them mine. is singular, however, that the shares under the circumstances are low. I recollect them 11 to 11½, when the mine was not in such ad position, having after paying a dividend of 6*s.* per share, upds of 2000*l.* carried forward to next account. J. A. F.

Redruth, Sept. 17.

PARYS MOUNTAIN MINE.

SIR,—I note the earnest appeal of Messrs. Watson Brothers to holders and the public to take shares in the Morfa-Du portion this mine, in which they head the list with a subscription for shares. It seems impossible to believe that Parys Mountain will cease to exist unless a small sum of 6000*l.* or 7000*l.* be ed subscribed, too, on such a gradual scale of demand as to render ment an easy matter of convenience. At the meeting about to held it is hoped all shareholders will attend, and come forward th alacrity and support the Morfa-Du Mine, and if not doing so it rtain that the Parys Mountain Mine will be immediately started a fresh company, reaping the fruits of the past efforts and exse of the present shareholders. Subscribers to Morfa-Du cannot their money, but must take a large premium, enormous interest the capital being a positive certainty in the bluestone deposits e, and this without reference to unlimited wealth in copper e. Immediate returns of an extensive quantity can be made at profits, 1000*l.* being all that is required, or less, beyond 5000*l.* for the sett, in easy payments to the Parys Mountain. Parys ntain is about to cut the rich Mona lodes, known to be close at d, and which would at once ensure much wealth; many other ts of interest also maturing to largely add to the future returns. main object, the intersecting the mass of ore in the great open being also not far distant, with easy drivage. If the Parys ntain shareholders come forward and support Morfa-Du the r must spring to 30*s.* per share.

SUBSCRIBER OF TWO HUNDRED SHARES.

PARYS MOUNTAIN MINE.

SIR,—With regret I see the above undertaking is about being ed-up in the Court, and I feel certain my regret is shared with en who are interested in the speculation. From the weekly re published by our agent it would appear we are on the eve of ent discovery; it seems from his report, indeed, that failure is st impossible—that the great bed of ore, which he is so anxious get at, and which has already cost us so much, must be near at d. Hence I would ask cannot something be done to prevent s from reaping the benefit of our outlay and trouble?

am sorry the Morfa-Du scheme has not met with the success it ld, and am of opinion that the shares should have been offered e public; but apart from that, could we not borrow (say) 3000*l.* m debenture or loan from our bankers on security of maery, &c.? This sum would enable us to proceed with the Parys n work, and if crowned with success would enable us to ay it, and if not we should not be much worse off than now. e something of this kind will be adopted to save the property, that we might yet realise our expectations. If you, Mr. Editor, the suggestion is feasible, perhaps the publication of it might to some such arrangement to be made.

Redruth, Sept. 19. A PARYS SHAREHOLDER.

THE MINES OF LLANRWST DISTRICT.

SIR,—Your correspondent, Mr. James Roberts, in his letter which published in the Supplement to last week's *Mining Journal*, ded his remarks by stating he had expected that someone else ld have replied to the cynical query of "Inquirer" two weeks ously regarding this district. Probably no one but Mr. Roberts ected the question asked entitled to a reply, the motive by it was dictated being so transparent.

e question, "Has there ever been a good mine in the Llanrwst ict?" might best be answered by asking another—"Has there been a poor one?" In all undeveloped districts some mine be first in success. What mine was there in the Prestatyn district to serve as a reference for the justly-celebrated classical Talerau? Or what mine was there to serve in the same capacity for ers, South Caradon, and Wheal Trelawny may also be instanced, how many others? It is not so much what a district has been as it is and is to be. When a district has been divested of its niferous resources its reputation in the past can avail nothing e present or the future. It is to districts where similar indications are observed as those which characterised the once prolific now defunct districts that the attention and energy of miners mine adventurers must be directed and addressed. The question of what the mines of Llanrwst have been is not of equal importance to us as that of what they really are, and are to be, although no operations were carried on in the past, and the products ch were derived therefrom, it will compare most favourably any district in the realm, whilst the future prospects are unequivocal. Mines cannot justly be deemed good or bad until they have proved to be one or the other. Mining naturally and necessarily takes cognizance of probabilities, and attaches an importance to them second only to that of ascertained and demonstrated To what an extent is not the wealth of every great and good le but prospective. In this respect many a progressive e is not more so, although for the present much less productive not only so from their not being so fully and extensively opened. There is this, also, which should be taken into account in favour of young mines, they must be regarded as a whole, whilst those of established reputation are not what they once were, in consequence of so much of their original wealth having been extracted. Nevertheless, districts in which good mines are, or have ever been, command attention, and inspire confidence and expectation in the success of enterprises in these districts, which, probably, are less promising and valuable in themselves than many other mines in less popular districts, at the same time many districts presenting similar features in their general outline and character, so far as can be ascertained and known to the old prolific ones, should be equally esteemed and appreciated, and I need scarcely add that they always will be by those most qualified to judge of their merits.

Llanrwst Lead Mine, Sept. 19. ROBERT KNAPP.

SUCCESSFUL MINES, AND MINE CAPTAINS.

SIR,—My attention has been called to a letter with the above heading, which appears in your Journal of last week. It contains remarks and statements which I consider it necessary to notice, not only on account of the company I represent, but to vindicate the position of a well-known manager, whose conduct and proceedings are unjustly aspersed. I had lately to expose the fallacies of one anonymous scribbler in your paper, and now the production of your correspondent, "A Miner," at least equally merits the severe condemnation which unscrupulous assertions deserve. Your correspondent dates from Lake Superior, which he says is some thousands of miles from this country, from which he appears to have been absent for the last thirty years. If this is the true state of the case, it accounts for his ignorance of the circumstances he refers to, and ought to have made him more careful in what he said.

He quotes the hackneyed phrases, "A good bal makes a good cap'n," and "Nothing succeeds like success." These may be true to a great extent; but it is, unfortunately, equally so that success creates envy, and causes jealousy to give vent to her evil tongue. I entirely dissent from the dictum of your correspondent that it is the invariable rule that "it is not the man that makes the mine, but the mine makes the man." Not a few cases might be given where a good mine has been carried on without success even by a "man" who thought himself "a miner," and which has been made profitable by a "change of management."

But your correspondent specially mentions Tankerville and Roman Gravels as mines which he thinks ought to be more successful if differently managed. He could scarcely have given stronger proofs of his ignorance of facts. When Capt. A. Waters undertook the management of Tankerville for the present company, in 1870, the mine was 90 fms. deep under the adit, the surface works and plant were of the most trifling and inefficient kind, and the profits did not exceed the rate of 1000*l.* per annum. The shaft is now down 190 fms. under adit, with numerous levels, cross cuts, and winzes, the plant and machinery are most extensive and powerful, and the profits divided have amounted to 58,200*l.*, or at the rate of 8314*l.* per annum, the whole capital expended having been 8000*l.* I boldly assert that very few managers would have accomplished so much work and profit with such means and in so short a time. In 1871 Capt. A. Waters became manager of Roman Gravels, which was then yielding a profit of about 800*l.* a-year, and with a working capital of only 8000*l.* he has not only accomplished a great deal of work, but has also given the shareholders 86,052*l.*, or an average of 14,342*l.* per annum. Your correspondent asks how often the manager goes underground in each of these mines, and then answers it himself by saying that he is *told* scarcely once a month. I cannot imagine what interest "A Miner" living at Lake Superior can have in the matter, or what could be the object of his correspondent in this country writing him on the subject, but I may tell him that he is misinformed, and that the fact is very different. But the chief manager of an extensive mine has much more to do than continually going underground. If he has efficient and trustworthy officers under him, he can conduct the operations to as definite a success as the most brilliant commander-in-chief who has won victories, not by his personal attention to every detail, but by the directions emanating from his superior judgment and skill.

Again, your correspondent writes:—"How is it that at the bottom of the engine-shaft at Tankerville he has such a long cross-cut cut to drive, when, if I understand right, his shaft ought to be in the lode. Perhaps he has sunk on the wrong part." Now, there is *not* a long cross-cut to the lode at the bottom of the shaft, and your correspondent does *not* understand right in assuming that the shaft ought to be in the lode. If your correspondent is "A Miner" beyond on paper, he ought to know that a lode sometimes changes its underlie, and, therefore, comes in and out of the shaft, and that it is, besides, often cheaper and quicker to sink by the side of the lode. At Tankerville the shaft is at present in the country by the side of the lode, and is in firm ground, requiring very little timber. It is just the right distance for plat from the shaft to the lode, and admits of their taking away the whole of the lode without let or hindrance to the shaft. Besides, for every 6 ft. they could sink on the lode they can get down 9 ft. in the country, and by sinking in the latter they can do so without a pump, which would not be the case were they following the lode.

I have said more than an anonymous writer deserves, but I have taken notice of his remarks for the sake of the shareholders in the mines referred to, and to justify their able and energetic manager.

8, *Austinfriars, Sept.* 20. J. H. MURCHISON.

MINING IN IRELAND—THE OOLA DISTRICT.

SIR,—I have recently had some of the Shallee men working for me here at Oola, and upon their return from a visit to their homes after the last pay they brought some very gladdening news. It appears that within the last few days Capt. King has made some excellent discoveries at his mine. They have opened out in two places a good lode 2 ft. wide, and in each place it is very rich. I am glad to acquaint you of this fact, and may remark that it affords another evidence of the injustice of neglecting the mineral resources of Ireland. With regard to this district it abounds with minerals of both lead and copper, many of the lodes being admirably situated for working. What a pity it is that so much English capital should be sent to foreign countries when there is such a splendid opening here in the county of Cork alone, not to mention other parts of Ireland, for the employment of capital, and where the money expended, if properly applied, would assuredly be productive of the greatest success.

I have now had eleven years experience in Ireland, and have seen a great part of it, and speaking from that experience I can say that there is no want of minerals, and that plenty can be obtained for little cost. The capitalists would be well paid for the small outlay necessary, though it seems to me that hitherto at nearly all the places that have been tried little more has been done than scratching the surface. This is not practical mining, and my belief is that if the mines were only fairly worked it would be found that Ireland is one of the richest countries in the world for mining.

Oola Mines, Sept. 20. J. PHILLIPS.

MINING IN IRELAND.

SIR,—I recently turned over some numbers of the *Mining Journal* during 1855, in one of which, for February of that year, I found the following remarks from your "Dublin Correspondent" of that period, and as they may be interesting to some of your numerous readers, I will thank you for space for their insertion. Your correspondent, after referring to Ringabella, South Cork, Carbery, West Glenaulin, and Connemara, says:—"Thus much for mines here, and glad am I, as doubtless will be your readers, that this synopsis, or whatever you may term it, is brought to an end. All I can say is my object is to put facts before the mining interest and the capitalists." He then refers in rather severe terms to the conduct of the directors of the Coosheen Mining Company, and concludes:—"I am sorry to inform you that the schooner Ann and Mary, Capt. Jones, which sailed early in the morning of the 8th inst. from Kenmare, with a valuable cargo of silver lead ore (118 tons) from the Lansdowne Mines, near Kenmare, for the River Dee, was early on the morning of the 9th, in a snow storm, driven into Spanish Cove, about a mile north of Crookhaven. It is reported that most of the cargo will have to be thrown overboard in order to save the vessel. I hope so valuable a cargo (say, 1600*l.*) is insured, and as the mine is worked by parties on your side of the Channel as a private adventure, who are mercantile men, there can be but little doubt such caution has been observed. It is somewhat singular to find that the Ann and Mary has been driven in close to Irish Consols, Spanish Cove being best recognised in the locality as the original name of the place, and as the latter mines have hitherto produced but little ore I should not be surprised if, in the agent's next report, it will be said (as truly it may be) that they are 'very near a rich deposit of mineral.'"

The cargo of silver-lead ore referred to by your correspondent, with many more tons of ore, was raised from sinking the shaft 6 fms., and stoping about 30 fms.; the same stopes will now produce 1 ton and the shaft about 3 tons per fathom. WM. THOMAS.

Cappagh Mine, Ballydehob, Co. Cork, Sept. 19.

CHINA-CLAY WORKS.

SIR,—It is pleasing to find that the china-clay trade is reviving so that the demand is nearly equal to the production. Great activity prevails in all the clay districts, particularly in those of St. Austell, St. Stephen's, and Roche, where such works are very numerous. Where they are under the management of experienced men a fair profit is derived. I was informed to-day that all those under the management of Mr. Stocker, Mr. Lovering, Capt. David Cock, and some others are profitable, and that all those under the management of a gentleman resident within a hundred miles of Truro are worked at a loss. How is that? Is it because the manager is inexperienced? The losses sustained by the several companies under his management are said to amount to probably 50,000*l.*, of which about 20,000*l.* has been borrowed from the bankers on the security of the works. From present prospects the securities may realise but very little. If so, the bankers ought to have exercised more caution in laying out their cash. I question whether the principal partner in the bank, who is a member of Parliament, is aware of the fact that such extensive advances have been made. If he were I should think he would not approve of the bank manager's conduct in lending such large sums on such securities. One of the clay works is out of Cornwall. In this case the original capital and fresh capital were exhausted, and 4000*l.* borrowed of the bankers, and yet here the company are said to be compelled by the terms of their lease to pay a rent of about 150*l.* per annum, and to keep several men doing unprofitable work, or perhaps nothing at all, because the lease requires their presence there. Capt. D. Cock is regarded as one of the most intelligent clay workers in the county, and he has shown a sound judgment in selecting as his representative, or superintendent of his clay works, a thoroughly competent agent, who for many years has been exclusively engaged in clay works; his name is Capt. Minnear, of the Indian Queens—a confidential man, whose character stands high in the estimation of all those who know him.

Newquay, Sept. 18. A TOURIST.

P.S.—If the information given me is incorrect I shall be thankful to be so apprised through the Journal.

BAD TIMES.

SIR,—The complaints against the prevalent depression in mining are very generally expressed. Nearly every person I meet in my travels exhibits feelings of sadness and despondency. Hopes of a rise in the price of tin so long indulged are giving way to despair. Thousands of our best miners have emigrated, and those who remain who are in work are so badly paid that they can barely exist, and there are scores who have no work to do. Shopkeepers who supplied goods on credit are unpaid to such an extent as to place many of them in difficulties, if not in bankruptcy. Mine agents who were formerly in the receipt of good salaries in mines recently abandoned are out of places. If you were to advertise for one agent you would probably receive 100 applications for the situation. In the train to-day a lady said that she advertised for a servant, and received 600 letters in reply, and what is remarkable the one she selected out of that number turned out to be a bad one. Some agents have been obliged to return to their original occupation as miners in order to live. Mines such as Tincroft, East Pool, South Crofty, and Carn Brea, in order to pay current costs, are obliged to send to the market enormous quantities of tin, thereby drawing largely on their reserves without any profit, whereas two or three years ago the same returns would have yielded handsome profits. I was informed to-day that tin is now down to 37*l.* per ton, which is, I believe, only 2*l.* above the minimum price. It has never been below 35*l.* per ton in my time, and Wheal Vor gave a profit of about 3000*l.* per month at that price. I believe that if the present low price is continued a year or two longer there will not remain half a score tin mines at work in Cornwall. There are some sanguine men who expect a rise in the price within six months. Meanwhile copper and lead mines should receive the attention of capitalists. But I caution them against placing their money in old deep mines, as many have inadvisedly done and lost it all. The money should be applied to the working of promising shallow copper and lead mines, and in opening lodes of a promising character in "virgin" ground, and in working for china-clay.—*Truro, Sept.* 15. R. SYMONS.

TYNANT SILVER-LEAD MINES.

SIR,—I have this week inspected the above mine, which is situated (on a good road) about 5 miles from the Llanfihangel Station of the Cambrian Railway. There are four well-defined lodes running east and west, and and north and south. On the No. 1 east and west lode a perpendicular shaft has been sunk 8 fms., and from the river an adit level has been driven under this point. The sinking of this shaft another 2 fms. will open up communication between the two, and the continuance of the level will not only in about 160 fms. from this point intersect the remaining east and west lodes, but prove of great utility as a main channel for bringing the ore from all parts of the mine to surface. There is a good branch of ore in the shaft, and at the other points opened on silver-lead of a very fine quality has been met with, varying in size from 1 to 6 in. wide, solid. The situation of the mine for its full and economical development is all that can be desired. Deep levels can be driven into the lodes from surface, which will dispense with the costly expense of sinking shafts. There is a good site for the erection of the necessary dressing machinery, and an abundant supply of water at all seasons of the year for all purposes. In conclusion, I believe this to be a most valuable mineral property, and have no hesitation in recommending it as a mine that will, with the outlay of a small capital, become a sure and lasting success. H. BOUNDY.

Goginan, Sept. 18.

SIR,—The LLFNANT MINE is situated in close proximity to the Glandovery Station of the Cambrian Railway. There is one massive lode running east and west through the sett. Two cross-cuts have been driven north for some distance to prove its width, but without as yet meeting with the hanging wall. Two winzes have been sunk below the cross-cuts on the soft part of the lode for a depth of 8 and 15 fms. respectively, meeting with good stones of copper ore embedded in a very rich copper gossan. I should advise the sinking of the winzes to a depth of 20 fms. each, the cross cutting of the lodes north and south from those points, and the extension of levels both east and west. If these operations are carried into effect I believe it will not only open out good paying ore ground, but give evidence of greater mineral wealth at a lower depth.—*Goginan, Sept.* 18. HENRY BOUNDY.

[For remainder of Original Correspondence, see to-day's Journal.]

THE SOUTHMOLTON SILVER-LEAD MINE.—Our readers in North Devon will be pleased to know that this mine, so abruptly closed about three years ago (in consequence of some territorial difficulty) is to be reopened. The grant of leases for 21 years having been obtained from the Right Hon. the Earl Fortescue, also of the adjoining estate, into which the splendid lode of solid ore (reported by Capt. Josiah Thomas) dips. The mine would never have been closed but that the complications then existing rendered it quite impossible to proceed, notwithstanding the fact that at the time of cessation rich ore was being brought to the surface in paying quantities. We have read with a great degree of satisfaction the reports and opinions of the well-known gentlemen who have inspected the property. Capt. Josiah Thomas is regarded as the greatest mining authority in England, and he states that there is a branch of solid metal worth from 40*l.* to 60*l.* per fathom in the mine dipping into the Smurridge property; and this report is likewise fully borne out by Mr. Walter Eddy, the mineral surveyor, and Capt. Joseph Pope, a gentleman well known in this country. The quality of the silver lead is very rich, and no doubt the lodes are continuations of those of Combmartin, so famed for its silvery ores, and where we are informed very successful operations are being prosecuted. It is gratifying to observe that a little

more attention is being paid to the long-neglected mineral wealth of these parts, and we incline to think that the rage for foreign investments is somewhat cooling down, and we are beginning to find that there are safer fields for legitimate investments nearer home. Of course, the South Molton is a somewhat exceptional property, and its working will no doubt have a very beneficial effect in attracting the attention of the mining world to the valuable mineral resources of North Devon.—*Western Observer.*

Meetings of Public Companies.

CLEDDAU VALLEY SLATE QUARRIES COMPANY.

The first ordinary general meeting of shareholders was held at the offices, Coleman-street, yesterday,—Mr. J. N. HARRINGTON presiding.

The CHAIRMAN said the present was the statutory meeting, held in compliance with the Act, which required a meeting of shareholders to be held within four months of the registration of a company. By the kindness of his colleagues he had been appointed Chairman of the company, and therefore presided to-day. It had already been communicated to the shareholders that the property was in active operation. The company took possession of the property on June 1 last, and, after going through certain formal matters, working was commenced at the end of the month. After the quarries had been in operation about six weeks, at the request of his colleagues he paid a visit to them. He had previously visited them before the company took possession of them, and on his second visit he was glad to see that great progress had been made since the company commenced operations. The result of his visit had been communicated to the shareholders in his report, which was circulated on Aug. 16 last. Since then he had been in constant communication withh the manager, and everything suggested had been carried out, or was in active progress. The principal part of the work which they had to do was the completion of the road up to the side of the hill to the quarries, to enable the slate to be removed to market. Arrangements had been entered into by which the slate would be conveyed from the quarry to the railway station, but that contract could not be commenced until they had put the main road up to the quarry into a proper state. On the previous day he received a letter from the manager to say that he could convey green slate to the market by the end of this week, and that by the end of next week the road would be in a sufficiently advanced state to enable him to remove the blue slate. At the same time the manager had actually sold many thousands of slates, but of course until the road was in a proper state he could not convey them to market. The words of his letter were:—"I have sold several thousands of slates, but I am in the position at present that I cannot send them down." Considering the difficulties there had been in several slate quarries in bringing them into working operation, and into anything like a paying condition, he thought the shareholders in this company might congratulate themselves upon having so soon brought this quarry into a profitable going concern. The profit at the present price of slates would simply be something enormous. The slaters told him they could make a thousand slates a day, and during the short time he watched them they were working at a rate that exceeded that amount. Aocording to that they could make 6000 slates from each set of slaters, but he would put it at 4000. He would not go into the question of the green slate for the present, but the price of the blue slate varied from 12*l.* to as low as 20*s.* per thousand. But he would take about 4*l.* as the average price, and according to that each set of slaters would earn 16*l.* in the way of slates for market. At present they were only using two men to each set of slaters, and not more than three rockmen, and the average wages of those men would be under 5*l.*, so the company was clearly making over 10*l.* for each set of slaters. Within eight weeks from the present time they would have the face of the rock 60 yards wide, which would supply rock for at least eight sets of slaters, and it did not require a great power of arithmetic to show what profits they might fairly anticipate from that amount of work. As was always the case at the commencement of the working of such a concern, there had been a large amount of dead work, and the wages account was heavy; but, watching the pay-sheet as he did closely, the outlay was bringing the company into such a state that he believed it would be one of the most profitable concerns he had ever been connected with in his life. Of course, there must be a beginning, they must commence in a small way. Before the year was out he hoped to have a dozen set of slaters at work, and from the facilities which existed for the production of slates he did not see why these quarries should not take rank with the celebrated Penryn, the Dinorwic, and the Festiniog. There was an ample supply of slates, and no mining, all was quarry work. There were great facilities of access to market, and the quality of the slates was all that could possibly be desired. Samples not picked had been sent up to the office in London, and had been examined by different members of the trade, all of whom had spoken of them in the highest terms, and said that the London market would take them to any extent which the company could supply them. The company's capacity for producing slates was only limited by the extent of capital which they had to spend in developing the quarries. Up to the present considerable sums of money had been spent in wages, for which they had had no return, but they were now on the point of beginning to get returns. The feeling of the directors was not to look forward for a time to giving large dividends, but practically to establish a reserve fund by the reinvestment of the profit which was made on the sale of the slate in the further development of the company's property. (Hear, hear.) On that point the directors were unanimous, and he had no doubt it would meet the views and best interests of the shareholders and debenture-holders. The capital which was being employed had been received by means of debentures, which carried a good rate of interest—10 per cent.; therefore they need not be anxious to make the dividend large, as the interest on the debentures, for the short time before they did commence dividends upon the shares, would be an ample return upon the investment made by the different debenture-holders. He had no resolution to propose, but he should be happy to answer any question which any shareholder might wish to put. He might add that 10 per cent. interest on the debentures might look a large sum, but in the several slate quarries which he had known to be established during the past few years, in every case the interest on the debentures was 10 per cent., therefore the amount was fixed at that which was usually paid under such circumstances, and the directors felt they were justified in doing so, as the profits derived from slate quarries were enormously large.

Mr. R. G. SMITH (a shareholder) said he was highly gratified with the report which the Chairman had been able to make.

On the motion of Mr. J. MASON, seconded by Mr. HAWES, a vote of thanks was passed to the Chairman, and the meeting broke up.

THE STAVELEY COAL AND IRON COMPANY.

At the annual meeting of shareholders held at Sheffield, on Thursday (Mr. H. D. POCHIN in the chair), the directors' report and balance-sheet set forth that the net available balance for distribution on the ordinary shares of the company for the year from all sources amounted to 69,019*l.* 16*s.* 1*d.*, and they proposed a dividend of 2*l.* 10*s.* per share on the A and C shares, and 8*s.* 4*d.* on the B and D shares for the half-year—a similar dividend having been paid in February. That would allow of 3853*l.* 2*s.* 9*d.* being carried forward to next year's account, increasing the balance available for future distribution to 43,729*l.* 13*s.* 2*d.* The debenture debt of the company had been reduced to 5350*l.*, 4500*l.* having fallen due and been paid off during the last year. The report alluded to the severe competition that existed in the coal and iron trades, and said there was no indication that it had yet arrived at its maximum pressure.

The CHAIRMAN remarked that there had been few years less favourable to the coal and iron trades than that through which they had just passed, and that, he believed, resulted from the fact that a few years ago there was considerable excitement and very large profits made, which induced persons in those businesses to extend their operations upon a scale altogether out of proportion to what might be called the normal demand for coal and iron. The consequence was that they had now a production of these the first necessaries of manufacture out of proportion to the demand and consumption, and they had had to contend with a decreasing demand, resulting in a diminution of profits, and the next to impossibility of selling articles at almost any price they were prepared to take. He thought very few concerns could proclaim equally favourable results to their own, and said that their success was in a great measure due to the fact that the directors in the years of prosperity had provided for such a state of things as was now presented. Alluding to the recent course of legislation with respect to the coal trades, he expressed the opinion that the cost of coal had been increased by such legislation at least 2*s.* per ton, and that if that 2*s.* could be taken off it would be the means of stimulating the business of the country to greater activity immediately. He pointed out that that increased price had not been attended by a corresponding advantage, and said that it was a mistake so to edge about the lives and safety of workman as to decrease his feeling of personal care and responsibility. Nothing could be devised to stand in the place of that individual care and attention on the part of the collier himself.

Mr. C. MARKHAM, in seconding the adoption of the report, remarked that the present state of things was a war of capital against capital, caused very much by the great activity in the trade a few years ago having stimulated the undertaking of worthless works, which were now competing with sound and substantial concerns.

SHEEPBRIDGE IRON AND COAL COMPANY.—The annual meeting of shareholders was held at Sheffield on Thursday, at which there was a large attendance. The directors' report stated that the result of the year's working was a profit of 8804*l.* 14*s.* 11*d.* After making all allowance for bad and doubtful debts, an interim dividend of 5 per cent. was paid in February last, leaving a balance of 1210*l.* 2*s.* 9*d.* It was now recommended that 10,000*l.* should be transferred from the reserve fund to the profit and loss account, and that a further sum of 8311*l.* 5*s.* should be divided amongst the shareholders, making up a dividend for the year of 5 per cent., and leaving 2998*l.* 17*s.* 9*d.* to be carried forward. The report was adopted, and the retiring directors, Messrs. Pochin and Jeffcock, were re-elected.

WEST BASSET.—At the meeting on Tuesday (Mr. J. Claude Daubuz in the chair) the accounts showed a loss on the three months' working of 700*l.* The labour cost (five months) was 7455*l.*; bills, 4123*l.*; carriage, 384*l.*; land destroyed, 134*l.*; bank charges, 1317*l.*; and dues, 211*l.*—total debits about 13,636*l.* On the other hand, tin is credited at 6173*l.*, and the last call at 2000*l.*, leaving an adverse balance of 10,337*l.* The most important figures, however, in the accounts were the liabilities, showing—due to merchants, 2868*l.*; due to Messrs. Tweedy, Williams, and Co., the bankers, 20,990*l.*; lords' dues, 1055*l.*; sundries, 1106*l.*—total liabilities, 26,329*l.* Against this heavy liability there are calls unpaid, 339*l.*; due from Copper Miners' Company, 355*l.*; and subsist, 165*l.*; leaving the large sum of about 25,000*l.* due from the adventurers, against which there is, of course, the tinstone on the mine, valued at some thousands of pounds. Some dissatisfaction was expressed that the adventurers were called upon at a moment's notice to pass liabilities approaching 30,000*l.* without once having had the opportunity given to them of seeing them, and it was strongly recommended by Mr. Heard that a small committee should be appointed from the general body of adventurers to confer with the committee of the mine, and enquire as to the exact financial position of the mine, and to bring up a report at an adjourned meeting, but the recommendation was not acceded to, and what has been described as an unwise zeal was shown to pass the accounts, and to give the appearance of fixing the shareholders to the bank and other liabilities, evidently outweighed all other considerations. Capt. Evans made several injudicious and ungentlemanly remarks, which entirely neutralised the efforts made by Mr. P. P. Smith and others to make his almost enforced resignation of the pursership as little disagreeable and prejudicial as possible in consideration of his position as a shareholder. A call of 6*s.* 8*d.* per share was made, and thanks were voted to Capt. Evans and the Chairman.

JAVALI COMPANY.

At the meeting of shareholders, on Monday, the following report for the six months ending June 30 will be submitted:—

The directors have to report that 8795 tons of ore, producing 640*l.*, were crushed during the first six months of 1877, as against 7517 tons, producing 609*l.* in the corresponding period of 1876.

The value realised from each ton crushed during the last half year was 14*s.* 7*d.*, against 16*s.* 2*d.* in the first half of 1876, showing a falling off in the average quality of the ore.

The dry weather, which began in November last, continued until July; and the stamps, which can usually be worked by water-power in January and February, have been worked by steam power throughout the half-year. This has caused not only additional expense, but also diminished results.

The tailing mill is now completed, and was partially worked during July.

No expenditure has been incurred on capital account during the half-year, except in connection with works previously authorised.

Capt. Sohns reached England on September 12, and will attend the meeting of shareholders. He speaks with confidence as to the future of the mine, believing that the falling off in the value of the ore is but temporary.

WEST PRUSSIAN MINING COMPANY.

The meeting of shareholders will be held on Wednesday, when the following report will be presented by the directors:—

The directors regret to state that the great depression in trade, to which they referred in their last report as affecting the company's ironstone mines, has now extended so as to affect its other mines, and the consequent decrease in the prices obtainable for the lead and blende ores, as mentioned in the manager's report, has seriously affected the year's profits.

As yet there is no appearance of an improvement in this respect, but it may be fairly hoped that when the existing war in the East is at an end, and the state of Europe more settled, there will be a favourable reaction and a general improvement in prices.

The report of the manager gives details of the state of the company's mines and the works carried out during the year.

The total profit earned will be seen to be 12,200*l.* 7*s.* 9*d.*; of this sum 3739*l.* 18*s.* 9*d.* has been paid to the preference shareholders in discharge of their preferential dividend of 8 per cent. for the year, and 2800*l.* to the A shareholders, being at the rate of 4 per cent. per annum for the second half of the year. Of the amount remaining over on profit and loss account the directors propose that a sum of 2,000*l.* be put to reserve fund, in accordance with the provisions of the Articles of Association, and that the balance of 3660*l.* 9*s.*, which, being represented by undressed ore at the mines, is not immediately realisable, and should be carried forward to next account.

A sum of 500*l.* has been spent on the purchase of concessions adjoining Ziethen, which it was considered advisable to obtain, thus increasing the purchase price by this amount over that originally stated in the prospectus.

In conclusion, the directors think it well to state that though the results of the year's working do not for the reason named come up to their expectation, they have full confidence in the future of the mines and the soundness of the enterprise.

Mr. WYNDHAM H. WYNNE, the manager, says—"The dressing works have now been in work for four months, and are at present producing about 65 tons of lead and 20 tons of blende per month. The continual fall in the price of lead and zinc, and the expiration of a very favourable contract, together with the want of competition among smelters, has adversely affected the prices obtained for the company's ores. The average value of the company's lead ore, for instance, having fallen, as compared with the prices of the beginning of the year, about 2*l.* per ton, which is equivalent to a reduction of profits of 25 per cent."

[For remainder of Meetings see to-day's Journal.]

CORNISH PUMPING ENGINES.—The number of pumping-engines reported for July is 15. They have consumed 1418 tons of coal, and lifted 10,000,000 tons of water 10 fms. high. The average duty of the whole is, therefore, 49,000,000 lbs., lifted 1 ft. high, by the consumption of 112 lbs. of coal. The following engines have exceeded the average duty:—

Mellanear—76 in.	Millions	62·0
Mellanear—Gundry's 80 in.		58·4
West Wheal Frances—58 in.		55·9
West Wheal Seton—Harvey's 85 in.		58·5
West Wheal Seton—Rule's 70 in.		62·7

CHEMICALS, MINERALS, AND METALS.—Messrs. J. Berger Spence and Co. (Sept. 15).—Acetate of Lime, 9*l.* per ton.—Alumina: Alum, 6*l.* 15*s.* for loose lump; ground, 7*l.* 15*s.*—Aluminous cake, 4*l.* 5*s.*—Ammonia: Sulphate, grey, 21*l.* 5*s.*; best London white, 21*l.* 15*s.*; muriate—white, 27*l.*; sal ammoniac, firsts, 45*s.*; seconds, 44*s.*—Acid: Tartaric, English, ground or crystal, 1*s.* 6*d.*; foreign, 1*s.* 5½*d.*, crystals; oxalic, 5*d.*; sulphuric, 3*l.* 10*s.* to 3*l.* 15*s.*; picric acid, 1*s.* 6½*d.* per lb.—Arsenic: Best white powdered Cornish, 8*l.* 10*s.*—Bleaching Powder: At 5*l.* to 5*l.* 5*s.*; for whole of 1877, 5*l.* 15*s.*—Litharge: Best flake, 24*l.*—Metallic Salts: Iron salts, green and rusty copperas, 55*s.*; in casks or barrels, 60*s.*—Copper Salts: Sulphate of copper, 22*l.*—Magnesia: Epsom salts, 3*l.* 5*s.*—Nitrate of Soda: 14*s.* 6*d.* to 15*s.*—Potash: Muriates, 80 per cent., at 7*l.* 7*s.* 6*d.* f.o.b.; Prussiate, yellow, 10¾*d.*; chlorate, 8½*d.*; bichrome, 4*d.*—Soda: Cream caustic, 60 per cent., 11*l.* 12*s.* 6*d.*; white, 60 per cent., 12*l.*; soda ash, 1¾*d.*; soda crystals, 4*l.* 10*s.*; bi-carbonate, 10*l.* 10*s.*; salt cake, 2*l.* 15*s.*; Glauber salts, 2*l.* 15*s.*—Sugar of Lead: Brown, 26*l.*; grey, 30*l.* 10*s.*; white, 37*l.*—Brimstone: Best thirds, 5*l.* 7*s.* 6*d.* to 5*l.* 10*s.*—China-clay: 15*s.* f.o.b. Cornwall; "Rosemellyn," 24*s.*; "BM," 34*s.*—Gypsine: Crude, 2*l.* 6*s.* to 2*l.*; calcined, 4*l.* 10*s.* to 6*l.*—Iron Ore: Hematite, 15*s.* to 22*s.* 6*d.*; Algerian, 53 per cent., 14*s.* f.o.b.—Manganese: Ores, 85*s.* to 90*s.* for 70 per cent.—Pyrites: Spanish cupreous, 5½*d.*; non-cupreous, 6¾*d.*—Phosphate of Alumina, 3*l.* to 3*l.* 10*s.* per ton.—Phosphates: High strength, 80 to 85 per cent., 1*s.* 4*d.* to 1*s.* 5*d.* per unit: Estramadura, 1*s.* 3*d.*; ordinary, 60 per cent., 1*s.*; precipitated phosphate of lime, 70 per cent., 5*l.* 15*s.*—Iron: Middlesborough Pig-iron, No. 1, 45*s.*; No. 3, 41*s.*; No. 4 (foundry), 40*s.* 6*d.*; No. 4 (forge), 40*s.* net.—Hematite, No. 1, 67*s.* 6*d.*; No. 2, 67*s.* 6*d.*; No. 3, 62*s.* 6*d.*; No. 4, 62*s.* 6*d.*; No. 5 (mott. and white), 61*s.*—Bessemer, No. 1, 67*s.* 6*d.*; No. 2, 67*s.* 6*d.*; No. 3, 62*s.*, less 2½ per cent.—Scotch warrants, 54*s.* 6*d.*; Scotch, g.m.b., No. 1, 52*s.* 6*d.*; No. 3, 50*s.* 6*d.* net.—Copper: Chili bars, 68*l.*; B.S. ingot, 77*l.* 10*s.*; tough cake, 75*l.* 10*s.*—Lead: Best English soft pig, 20*l.* 5*s.*; German soft pig, 20*l.* Liverpool or London—Spelter: Silesian, 20*l.*; English, 19*l.* 5*s.* on rails, works.—Tin: Straits, 65*l.*; Australian, 64*l.*: British, 70*l.*—Tin-Plates: Best coal, 26*s.*; charcoal, 25*s.*; best coke, 23*s.*; coke, 22*s.*—Tubes and Fittings counts on application.

THE IRON AND STEEL INSTITUTE—EXCURSIONS.

WESTWOOD COLLIERY.

Guided by Mr. Jenkins, Mr. Greenwell, Mr. Ainsworth, Mr. Hedley, the managing viewer, and other gentlemen, the visitors evinced a lively interest in the business they had entered upon. colliery, the royalty of which is about 800 acres, was started in There are five workable seams of good coking quality. The which are now being worked are known as the top and bo Busty seams, the depth of which are about 28 fathoms. Adj the colliery are 152 ordinary common beehive coke ovens of and 11½ ft. diameter each. The coal raised at the colliery is into coke by these ovens. So as to be on a level with the coke for easy filling the benches are raised, and the branches are out that no horse work is required. The empty trucks are se one end, and fall with an easy gradient to the other end witho aid of any horse or engine power. Steam is raised by the ap tion of coke-oven heat. The flue from 22 coke ovens is conne two ordinary cylindrical egg-ended boilers of 45 ft. in length The temperature at the oven end of these boilers is about 152 at the chimney end about 760°, so that something like half heat is abstracted in going underneath the boilers, which is u in raising steam. These boilers work a winding-engine, to is connected a drum for moving the apparatus which raises th after screening and cleaning to the level of the coke oven. also supply steam to an engine which works a Carr's patent tegrator. The output of the colliery is about 500 tons per Altogether the company own eight collieries, the total outp which is 3580 tons per day. About 330 men are employed colliery and the ovens. The coke made here is of first-rate q After inspecting all that was interesting the visitors returned train, and proceeded to the Consett Ironworks.

SEATON DELAVAL COLLIERY.

Few undertakings in the coal trade of Northumberland proved more successful than the speculations of the Seaton D Coal Company. It may be stated, however, that from th mencement of the Old Delaval Colliery, nearly 40 years ago, t moters entered the business with much spirit, and the collie at that time conducted on a very large scale, until now, wh are the largest, Cambois excepted, in the whole county of Nor berland. The collieries possess a great advantage in being i proximity to the Blyth and Tyne section of the North-Easter way, and, as an instance of the immense output, it may be tioned that no less than seven locomotives belonging to th company are engaged in conveying coals to the Tyne Dock fo ment. There at the present time four working pits—the F the Richard, the E. F., and the Hastings pit, or Hartley wi At these something like 1900 men are employed above and ground. The first sod of the Old Delaval Colliery was cut on M 1838, and this was the only pit until 1860, when the Forst first commenced, the latter being followed by the opening Richard in 1860, and the Hartley about a couple of years ago management at each seems to be of the most perfect descri and reflects the greatest credit on the manager, Mr. T. G. the certificated manager, Mr. T. W. Askwith; Mr. Thomas engineer; and all concerned. The average output from th the present time is about 2000 tons per day, but in consequ the present slackness in trade of every description the co have only been working seven days a fortnight for the la pays, but previous to this they were known as some of t workers in the county. It is hoped that a better state of will come about in a short time. The depths of each pit follows:—Forster, 112 fms.; Richard, 80 fms.; E. and F., 6 and Hastings, 60 fms. The two former are distant about 2 from the smaller ones, but a line of railway connects the tw nected with the collieries there are a blacksmiths' shop, con eight fires and a 10 cwt. steam-hammer, a commodious s used for the purpose solely of preparing timber for the m fitting-shop, in which are employed about 20 men, extensive works, fitted up with machinery of the most recent date, and are also premises used for making gas which is supplied to th The machinery at each pit is of the best possible descriptio within the past few years great additions and improvement been made in this way.

At the Forster there is at work a double horizontal winding by Messrs. W. Rule, Horsley, and Co., of Seaton Sluice, wh we believe the first of the kind introduced into the count cylinder is 3 ft. 6 in. in diameter, 6-ft. stroke, with winding 19 ft. in diameter. Four tubs are drawn at a time, and imme they arrive at bank they are wheeled off to "Billy Fairplay," system has been adopted at each of the collieries. At the time a very large compound pumping-engine is being erected ground to force the water to bank. It has a 35-in. cylinde pressure 60-in. cylinder, the weight of which is 11 tons. also a novelty at this pit in the shape of a self-acting endles which is used for bringing up coals, and which has been the of dispensing with a large amount of horse work. The mo simple as it is clever. The Richard is an upcast pit, being b with self-acting doors on the pit top, which rise and fall w cage. The work underground is mostly done by horses, there no engine below like the other. Small as this pit is, howe output averages 700 tons per day. The gearing at bank is the coarse description usually seen, being all trellised, wh powerful sheer-legs are exceedingly neat. The engine is a horizontal one, the cylinders being 22 and 20 in. respectively, the drums are 10 ft. in diameter, and are of cast-iron. There a fan-engine with a 30-in. cylinder, and a 30-ft. stroke, the d of the fan being 36 ft. by 12 ft. Considerable pains appear to b with the engines, which are spotlessly clean, and kept in be order. The old colliery, or E. and F., is worked with a winding-engine of the old type, the cylinder being 38 ft., th 6 ft., and the drums 19 ft. 9 in. in diameter. An endless chai works four branches, has also been introduced at this collier it requires to be worked by an engine, and is, therefore, not value as that at the Foster pit. The output here is somethi 600 tons per day. The Hastings or Hartley pit has been w is not at present being worked, but exploring, which i have been so far successful, is being carried on, and it is ex that in a short time this pit will be again got underway. The of the collieries have done exceedingly well in the past, and requires trade to become brisker for a continuation of pro It may be mentioned that very few accidents have happ Seaton Delaval, and what have occurred have not been of m the ordinary kind.

CAMBOIS COLLIERY.

During the past few years the village of Cambois, which time ago was a pleasant little seaside resort, has been trans into an extensive colliery village, and in the place of about cottages some 350 comfortable dwellings for the workmen colliery have within that time been erected. The Cambo liery, which as a single drawing-shaft is the largest in the of Northumberland, is the property of the North Seaton Co pany, which is composed of Mr. John Straker, Mr. Hugh Mr. G. B. Forster (head manager), and other influential gen The company are the possessors of 1400 acres of royalty, wh hold from Sir Matthew White Ridley, Bart. The colliery i about two miles and a half from Blyth, at which port the c shipped, being conveyed to the extensive staithes by a Eastern locomotive, along a line of railway belonging to company. The colliery was opened out about ten years ag now 105 fathoms in depth. There are no less than 770 ployed above and below ground ground. The company have most extraordinary run of success, and at present are wor splendid seam of coal, which averages about 4 ft. 11 in. in

...in seam. The pit is not under the sea, and is worked by the ...don Wall system. The output has for a long while been, and is ...d the largest in the county. During the coal famine, a few years ...for a day of twelve hours 1900 tons was the output, and at the ...ost time the average is 1250 tons per day, but there has been ...considerable decrease in the number of hours worked. The Welsh ...em of "Billy Fairplay" has been adopted at this colliery, and ...said to be a slight advantage to both employers and employed, ...competent judges opine that the system is scarcely worth the ...ense outlay required for its adoption. The machinery em...loyed in the working of the pit is of the most excellent descrip...tion. The heapstead, a splendid erection, is of iron, and embraces ...all of the latest and best improvements. There is a double ...ental pumping-engine at the bottom of the shaft, which forces ...water to bank, and there are also two hauling-engines, one ...ring the distance of a mile, and the other 1100 yards. One of ...se is worked by a self-acting single rope, and the other by a tail...rope. There is also a vertical winding-engine, with a 65-in. cy...linder and a 9-ft. stroke. A hydraulic engine, which gets its pres...sure from the pumping-engine, is used for bringing the water out of the deeper workings at a pressure of 300 lbs. to the square inch. There are five tubular boilers used for the winding-engine, and two of the same class, with two locomotive boilers, serve to drive the winding-engine below. Notwithstanding that the machinery is so perfect, the pit cannot be worked without a great amount of horse-power, and at present 106 horses and ponies are employed under-ground. The hard times do not appear to have affected the working of the pit to so great an extent as it has the majority of collieries in the neighbourhood. The seam of coal is a very good one, and is not likely to be won for a considerable number of years hence. The owners are also the owners of the North Seaton and Isabella and Cowpen pits at Cowpen. Connected with the pit there are extensive works for the manufacture of bricks for building purposes, which are made from seggar clay from underneath the seam, mixed with the shell obtained from above the seam. There are also commodious blacksmiths' and joiners' shops at the pit, but the major portion of the jobbing work is done at the company's premises at Cowpen. Fortunately there have been very few accidents at this colliery, a fact which speaks volnmes for the certificated manager, Mr. Thos. Ellison, who has also charge of the North Seaton Colliery.

BINCHESTER COLLIERY, NEAR BISHOP AUCKLAND.

This colliery is owned by Messrs. Bolckow, Vaughan, and Co., being their most recently instituted undertaking. It lies conveniently close to the turnpike road running between the towns of Bishop Auckland and Spennymoor, and is also equi-distant from either of those places, which are a little over four miles apart. Although generally spoken of as Binchester Colliery, there are here two entirely distinct pits—Binthester and Westerton—the former working the Brockwell seam for coking purposes, and the latter working the Main Coal and Five Quarter seams for household coal. What known as the Main or Butterknowle Dyke, of 120 fms., runs between the two pits, and causes the coal in the two seams to be obtained at about a uniform depth of 80 fms. The work of sinking was begun on July 10, 1872, and it is rather a singular circumstance that the first coal was won on the polling day for the Parliamentary election for South Durham, Feb. 11, 1874. The Binchesier pit is worked by a powerful vertical winding-engine, 40-in. cylinder and 6-ft. stroke. The drum is 18 ft. in diameter. The engine is from the establishment of the Haigh Foundry Company, Wigan, and was made in date 1875. The cylinder is fitted with escape valves. The boilers by which work the winding-engine are eight in number, and are fired by a double-acting vertical engine with two forcing pumps. The winding-engine exhausts into a vertical boiler 36 ft. in height, and about 6 ft. in diameter, which is used to heat the water for the boilers. The cage itself, the ropes of which are fitted with Fowler's detaching-hooks, is a double-deck, and also carries two tubs each containing 18 cwts. of coal. Each deck will accommodate eight men. In construction the shaft is round, with a diameter of 16 ft. On being conveyed to the heap the coal is tipped over eight screens, which empty into one large hopper. In addition to the machinery of which mention has already been made there are two underground engines. a hauling engine, and a pumping engine, the latter forcing about 400 gallons per minute. An important and highly interesting feature in connection with the working of the two collieries under notice is the utilization of the waste heat for the coke ovens for the purpose of heating the boilers, the result of which must necessarily be an enormous saving from the consumption of the ordinary fuel.

The smoke is conveyed from the ovens by long flues, and passes underground to the boilers. In connection with this arrangement there are two chimneys, one of them being 160 feet in height, which with the double purpose of causing a draught, and providing an outlet for the gases which gather in the flues. Demonstration is thus made of the possibility of a beneficial compliance with the often misapplied demand, "Consume your own smoke," an extensive manufacture of coke being here carried on without the presence in the atmosphere of the latter, at any rate in the form of vapour. The ovens attached to the collieries are 267 in number, and comprise two groups, the larger of which, including some 227 ovens, is built on the south-east side of the Binchester pit boilers, the lesser group of 40 ovens lying to the north of the colliery. The latter are beehives, and have only been in use about a month or six weeks. The more extensive group began to work in the autumn of 1874, but at present time nearly the whole 227 ovens are drawn. Each requires to be supplied with 7 tons of coal, the filling being effected by aid of a small locomotive engine, which travels along a railway on the top of the ovens, drawing each journey 12 iron tubs containing about a ton of coal. Another peculiarity in connection with the ovens is that the "benches" or platforms on which the doors are drawn out are nearly on a level with the tops of the trucks which the latter are on the railway, which runs between the two rows of ovens. By this arrangement the work of loading the trucks is greatly facilitated, and as it also saves the breaking of the coke may be described as being a decided improvement on the older and more generally adopted method of filling trucks. The ovens when they are cooled, the water used in the process being conveyed to a large reservoir situated on the east side of the colliery by pipes, which also answer the purpose of hydrants, and one of which is fixed between every couple of ovens. For each oven, however, there is a separate hose-pipe provided. The water which is pumped from the workings of the collieries is forced into the reservoir, which is capable of holding 1,000,000 gallons, and contains a regular supply of about 5000 tons of water. At Binchester pit there are about 600 men and boys employed, and the daily output of coking coal is from 900 to 1000 tons. The weekly make of coke is 1850 tons, of which by far the greater portion is sent to Messrs. Bolckow's works at Eston. The coke is of first-rate quality, and when it comes to enter the markets it commands a ready sale at good prices.

A short distance to the south-east is the Westerton pit, the coal of which, as was remarked at the outset, is used for household and general purposes. It is sold in the London market as Tees Head, and is of such excellent quality that it is said to rank best of all best in the marts. This pit is worked by a large horizontal engine, with steam brake attached, capable of raising 1000 tons per hour. The cylinder is 36 in., and the stroke 6 ft.; the drum is 15 ft. in diameter. The makers were Messrs. R. and J. Coupe, Worsley Mesnes Ironworks, Wigan. The boilers are six in number, and are fired, as at the adjoining colliery, by underground flues, connected with the waste heat from the coke ovens. The Westerton pit is almost similar to the Binchester one, but at present the shaft contains only one deck, although it is intended to introduce a second deck cage as the workings become developed. The cage carries two tubs, each of which will hold about 8 cwt. of coal. As to the working of coal is concerned the old Westerton Colliery is disused, but the shaft is still used for the purpose of changing the men, as a second shaft, for the purpose of ventilation and escape. At the new Westerton heap the coal is tipped upon six screens, by which the best is separated from the small, the former falling into a large hopper, and the latter being drawn up by self-acting apparatus tubs to another platform, where they are tipped over another set of screens, from which they pass into the trucks as small and nuts. Three hundred men and boys are employed here, and the daily output is from 500 to 600 tons. The royalties which are here in course of working belong to the Dean and Chapter of Durham, and are leased by the proprietors of the mine, which, with land and house property, is rated in the townships of Binchester, Old Park, Westerton, and Middlestone, the whole area of the colliery comprising 1000 acres. On account of the superiority of the machinery, fittings, &c., the colliery is considered to be one of the best in the county, and the owners attach no little importance to it as a valuable part of their large share in the mining interests of South Durham. A private line of railway, laid down by the owners, runs from the colliery to Merrington-lane, a distance of 2¼ miles, where connection is effected with the Ferryhill branch of the North-Eastern Railway.

The two pits are lighted with gas supplied by the Spennymoor and Tudhoe Gas Company, and what is termed in general parlance the "Waskerley" water, supplied by the Wear Dale and Shildon Water Company, has been put in to supply the locomotives now in use at the colliery. The workshops at the bank are only temporary structures, it being held in contemplation to erect a line of permanent workshops on a convenient site on the east of the colliery. To evidence the remarkable prosperity which has attended the undertaking, we may say that there has not been lost one day, from any cause whatever, since the mine was started. Its career has been distinguished by the entire absence of any serious casualty either above or below ground, and although accidents to miners have occurred, they have been very few indeed. The collieries are under the management of Mr. R. Robinson, of Howlish Hall, who occupies the responsible position of resident manager over all Messrs. Bolckow and Vaughan's collieries situate in the Bishop Auckland district. Mr. M. S. Hall, of Westerton, is the certificated manager for the Binchester Colliery; the chief engineer is Mr. T. Chisholm, of Coundon; and the assistant colliery manager is Mr. Davies, Hartley House, Coundon. In the immediate vicinity of the colliery there is a row of 19 wooden houses, each containing two rooms, originally put up as temporary structures for the housing of the sinkers; 18 of the number, however, are occupied by workmen and their families, the odd house being utilised as a sort of office. The bulk of the workmen reside at Old Park, or what is better known locally as Binchester Cottages, a village within half a mile from the colliery, consisting of 79 double houses, each containing four rooms, 49 single houses of three rooms each, and the residence of the colliery overman. These cottages were erected by the colliery owners, the freestone of which they were built being obtained from the quarry on the top of Westerton Hill, and conveyed down to the colliery, together with lime from a kiln on the east of the quarry, by means of an endless chain. The coke ovens are constructed of the same material as the colliery houses, which are in every respect of the highest class, and infinitely superior to the general pit rows of the county. In a sanitary point of view these cottages may fairly be set down as models of their class. There is ample yard room attached to each, but perhaps their distinguishing feature is that in every case the ordinary water-closet and ashpit have been dispensed with, and a patent ashpan substituted in lieu thereof.

In addition to this, the owners are engaged laying in the Waskerley water to each cottage. The population which the establishment of the colliery has been the direct means of drawing together may without exaggeration be computed as closely approaching 800, taking into account women and children. Not only have the owners been careful to provide improved dwellings for their workpeople, but the welfare of the children of the latter has not been forgotten by them, for they have lately erected and opened a large school near the houses at Old Park, in which accommodation is provided for 350 mixed scholars. The Binchester Colliery School is supplied with an efficient teaching staff, and it has very wisely been placed under Government supervision. There is no permanent Dissenting place of worship in the place, but religious services are conducted in connection with the Wesleyan and Primitive Methodist bodies, in rooms set apart for the purpose by permission of the colliery proprietors. In addition to these religious efforts, a temporary iron church, with graveyard adjoining, has been opened, mainly through the instrumentality of the Rev. C. Carr, rector of Whitworth. As an evidence of the impetus which has been given to building speculation in the neighbourhood of the colliery, it may be stated that since the time when full working operations commenced nearly 130 dwelling-houses have been built at Middlestone Moor, and upwards of 30 in Westerton township, principally occupied by pitmen employed at Binchester. There is also reason to anticipate that the number of dwellings which have thus been built by private speculators will not remain stationary. Already plans for the erection of between 200 and 300 additional houses have been passed by the local sanitary authority, but owing to the depressed state of the times building operations here are almost at a standstill. The following figures, showing the gross estimated rental of property in the four townships in which the colliery property is rated, will demonstrate the remarkable increase in house property which has followed the establishment of Binchester Colliery:—

	1874.	1877.
Westerton (in which the colliery itself is rated).	2197	8322
Middlestone	2696	4888
Old Park	1574	4417
Binchester	2575	3629

Allusion has been previously made to the old Westerton Colliery, which, it may not be uninteresting to add, was one of the collieries worked by the late Mr. Nicholas Wood, having been bought by him, together with the neighbouring collieries of Black Boy, Coundon, and Leasingthorne, for the sum of about 75,000*l*. There is another historical fact in relation to the Binchester Colliery which may not inaptly be cited:—The western workings of this pit will eventually extend to a portion of what, at the commencement of the present century, formed the Binchester estate, concerning which a local historian, Mr. M. Richley, thus speaks in his History of Bishop Auckland—"The owner having proposed and commenced sinking a coal pit in close proximity to the palace at Auckland (greatly to the annoyance of Van Mildert, who was then Bishop of Durham), overtures were made to the trustees for its purchase. The offer was favourably received, and the trustees allowed three years to make the necessary arrangements. Application was accordingly made for an Act of Parliament to enable the Bishop to enfranchise property in order to raise a sum of money for the purchase of Binchester, but alarmed at the precedent of selling Church property Lord Shaftesbury opposed the measure, which would have been thrown out but for the interference of the late Lord Eldon, through whose influence the Binchester Estates Act, 7 and 8 George IV., was at last obtained. Under the powers of this Act 63,027*l*. 16s. was raised and paid into Court, of which 54,535*l*. was invested in the purchase of lands and tithes at Binchester." The workings of the Auckland Park Colliery of Messrs. Bolckow, Vaughan, and Co. will run beneath the park attached to the episcopal residence at Bishop Auckland.

— *Newcastle Daily Chronicle.*

TRAMWAY CARS.—Some time since Mr. EDW. PERRETT, of Westminster, invented an improved means of connecting and disconnecting, and also of steering the leading and the trailing wheels simultaneously, and from either end of the car; this he finds to be a needless complication, and now he provides no means of connecting the frames of the leading and trailing wheels. He provides steering gear at each end of the car as before, but steers only with the leading wheels for the time being. Further, he has found that after the leading wheels have entered upon a curve it is necessary to resist their following around it too freely, otherwise the wheels of the fixed wheel base may not be diverted from the main line. He now arranges the steering gear in such manner that by means of it, and without any undue exertion on the part of the steersman, considerable resistance can be opposed to the motion of the pivotting frame about its centre; one way of doing this is to form a curved rack on the front of the pivotting frame, and to arrange a pinion to gear with it. On the axis of this pinion, which is vertical, is the steering wheel, and he also provides a treadle break, by which the axis of the steering wheel can be held at pleasure, so that it can only turn with difficulty. By turning the steering wheel on approaching the points where two roads diverge the flanges of the wheels are made to take the road desired, and immediately they have done so the treadle is used to ensure the following wheels taking the same track; or without the treadle the turning of the steering wheel may be resisted by means of a break, strap, or even by hand. In some cases he employs hydraulic cylinders to check the motion of the pivotting frame, as soon as the leading axle commences to deviate from a position parallel to the other axles, and he arranges that that this resistance may be taken off when it is not required for the purpose explained. The cylinder is attached to the body of the carriage, and it contains a piston, the rod of which is connected by a link to the pivotting frame. The cylinder is charged with liquid, and its two ends are connected by a passage, on which there is a regulating cock or valve.

EXPERIMENTS WITH DYNAMITE AT ABERYSTWITH.

A series of interesting experiments, showing the capabilities of dynamite as an explosive for blasting purposes, have been made by Messrs. Griffith Williams and Son, agents for Nobel's Explosives Company, under the conduct of Mr. William Toye, the representative of the company. Among those present were Capts. James Paull, W. H. Paull, and — Rowse, Goginan Mine; Peter Garland, Lisburne Mines; John Mitchell, Cwmystwith; John Paull, Cefn Cwm Bryno; Thomas Glanville, Cambrian; Wm. Trevethan, Melyndwr Valley; John Couch, West Goginan; John Owens, Grogwinion; Thos. Kemp, Bronfloyd; John Sprague, Cardiganshire; Frank Kitto, Red Rock Mine; John Ridge, Rheidol; John Williams, Florida; Sampson Trevethan, Tynllidiart; Mr. David Owen, manager of the Ratgoed and Cymerau Slate Quarry; Mr. A. Evans, Ashton Mines, Pwllheli; Mr. Hugh Hughes, jun., Aberystwith; Mr. C. H. Stokes, Aberystwith; Capt. Edward Humphreys, Queen's-road; Mr. Isaac Morgan, Mr. G. Green, Mr. James G. Green, Mr. William Green, &c.

The experiments were made on the beach under Constitution Hill, about ½ mile towards the Vale of Clarach. Standing on a rock Mr. Toye first showed the safety of the explosive by opening two or three cartridges and igniting them by means of a common lucifer match. The dynamite flared harmlessly away, very much in the same manner as wetted gunpowder would do, or the simple firework known to juveniles as "the devil." Mr. Toye remarked, while burning the dynamite, that he should not like to make the same experiments with gunpowder, nor, indeed, would anyone else in his right mind.

After the various experiments had been satisfactorily performed, the company assembled at the Belle Vue Hotel, where an excellent luncheon was laid out. Mr. Isaac Morgan, J.P., occupied the chair, and Mr. Peter Garland the vice-chair. The usual loyal and patriotic toasts having been given, Mr. Pell proposed Noble's Explosives Company, to which Mr. Toye responded, dwelling upon the safety of the material, its component parts, and its adaptability to wet and faulty ground where black powder could only be used with considerable trouble. By the use of dynamite, he thought, shafts could be sunk quicker than by any other means, and mines which were now paying no dividend could be made remunerative.—The Chairman followed by proposing the Mining Interest of Cardiganshire and Adjoining Counties, and in doing so expressed the desirability of seeing the royality on mines reduced.—Capt. Henry Paull, Goginan, acknowledged the toast on behalf of Capt. Thomas Paull, whose health was drank in a bumper.—At Capt. Sam. Trevethan's request several persons rose to give their experience in the use of dynamite.—Capt. Granville, of the Cambrian Mines, said it was now used at the mine with which he was connected in sinking a shaft. The ground was faulty and wet, and could not be easily worked with black powder. The dynamite was simply thrown into a hole and it exploded at once. In fact, the men at the mine had been able to sink at the rate of 6 feet a week in a shaft 11 feet long. Not half the work could be done in the time by powder.—Capts. Couch and James Green also spoke to the effects of the explosive. The latter said it was better in wet ground than powder it required no tamping, and no boring of holes.—Mr. Hughes, jun., gave the toast of the Mining Engineers of the County, to which Mr. George Green responded.—On the proposition of Mr. Pell, the healths of Messrs. Griffiths Williams and Son, the agents of Noble's Explosives were drank with musical honours.—Mr. Evan Jones Williams having responded in appropriate terms, several other speeches followed, in the course of which Mr. Stokes thought a decreasing royalty should be paid as mines got deeper, and the difficulty of working greater, and Mr. Griffith Williams expressed his opinion that mines in Cardiganshire were not worked deep enough to make them profitable.

APPLICATION OF ELECTRICITY IN BLASTING.—A series of scientific experiments were made last week by blasting with dynamite and electricity, at the Moel-y-Gest Granite Quarry, Portmadoc. The experiments were conducted by Mr. Harris, Nobel's Explosives Company's travelling instructor, and Mr. Parry, of Llanberis, the local instructor, for the purpose of demonstrating the utility of simultaneous blasting with dynamite, under various conditions. In this instance, instead of having holes drilled in the rock in the ordinary way, as is done for gunpowder and other explosives, several joints were cleared and charged with dynamite at three different points situated in such positions that each charge would work to and assist one another, as it is well known that the resistance is far less to a number of charges exploded at one and the same moment of time than separately. Brain's electric fuse was then inserted in each charge and coupled up in circuit by small connecting wire, insulated with gutta percha and joined to the main cables leading to the electric machine, which was situated at a safe distance up the side of the mountain. All being ready, and the workmen warned off, the electric machine was unlocked, and the cables fixed to the terminals, and, by simply turning the handle, a current of electricity was discharged through the cables exploding the whole of the charges at once. The mass of rock operated on was at once dislodged, and tumbled over into the bottom of the quarry in large blocks fit for splitting and cutting up for setts, building, and other purposes. The second experiment was similar to the first, except that the charges were at a considerable distance from each other, for the purpose of demonstrating to those present that distance makes no difference whatever in electrical exploding. These were then exploded by the electric machine in the usual way, uprooting the different sections of rock in which the charges had been placed. The exploding apparatus was a frictional high tension electric machine, insulated perfectly, so as to be thoroughly protected from damp—a great enemy to electricity—and capable of exploding 300 or 400 charges simultaneously, if required. It gives a spark 2 in. long, is very portable, being fixed in a small oak case, and weighs only 14 lbs. The party were very much pleased with the successful manner in which the experiments were conducted, and they gave great satisfaction to all concerned.

SAFETY-LAMPS.—Hitherto the principal difficulty in the construction of miners' lamps has been that of supplying a sufficient current of air to obtain the maximum of light and at the same time secure the safety of the miner from the danger of explosion. The object of the invention of Col. J. D. SHAKESPEAR, J.P., of Ramsgate, is to remove this difficulty. In his former lamp the ventilation of the lamp is obtained by means of a metallic ring arranged below the wick holder and forming the basis of the combustion chamber. This metal ring is pierced with lateral holes, these being covered with wire gauze as the protection against the firing of dangerous gases. The improved lamp is also provided with a corresponding metal ring, but the apertures therein are not pierced simply in a radial direction but diagonally through the ring, so that the current of air as it is drawn in by the combustion of the oil does not impinge directly upon the flame but passes into the combustion chamber in a diagonal direction, and so forms a kind of vortex or circular current around the flame. This arrangement not only increases the intensity of the light but also maintains the steadiness of the flame. This prevention of flickering or waving of the flame is a most important point in miners' lamps, and in this improved lamp it is further provided for by means of a small metallic cylinder fitted outside and at the lower part of the ordinary wire gauze chimney

of the lamp. This addition effectually prevents any flickering of the flame however strong the current of air may be to which the lamp is exposed. In his former Letters Patent he described the surrounding glass or combustion chamber to be of a truncated conical figure, convex upon its internal surface, but in the present invention he prefers to make the lenticular glass with the convex surface outside and the plane surface inside. Or, if preferred, instead of the conical form of glass it may be made of a cylindro-convex form. With these several improvements the flame is rendered perfectly steady, and the maximum of illuminating power is attained. These improvements in ventilating miners' lamps are also applicable to other lamps or lanterns where it is desirable to shield the flame from direct currents of air which this diagonal system of regulating the air effectually secures.

THE COMSTOCK LODE, AND THE SUTRO TUNNEL.

[FROM THE AMERICAN CORRESPONDENT OF "THE TIMES."]

The announcement that the famous Sutro Tunnel is approaching completion has directed attention to this great engineering work, which is destined to have a most important influence upon our mining operations for the precious metals. The main source of the supply of gold and silver in the United States is the Comstock Lode, in Nevada. In this lode are the great American mines of world-wide fame, the California, Consolidated Virginia, Belcher, Ophir, Chollar, Eureka, &c., upon which the mining operations of the Pacific Coast are mainly based. The lode is near Virginia city, Nevada, in a mountain, at the eastern base of which flows the Carson River. The shafts of the mines have been sunk to great depths, so that the cost of pumping water and hoisting out the ores is enormous, while the difficulty of ventilation is also great. To save these enormous outlays, and also to add to the productiveness of the mines, Mr. Adolph Sutro several years ago projected the tunnel which bears his name, which is drilled into the mountain from the Carson River level, and is intended to strike the mines at a level of 1800 ft. below the surface, freeing them from water by its natural outflow, providing ventilation, and, by a railway, easy means of getting out the ores. Mr. Sutro has carried the tunnel almost to completion in the face of unusual difficulties, and partly by the aid of English capital, and when it is opened it will not only be one of the greatest engineering works of the country, but will have a marked influence upon American gold and silver production.

During the past six years I have from time to time given statements of the progress of this remarkable work, and now that it is nearly finished a further account will be interesting. The tunnel upon Aug. 15 had been bored a total distance of 17,731 ft., leaving a distance to reach the easternmost workings of the Comstock Lode, the Combination shaft, of 708 ft. This tunnel, more than 3½ miles long, is as straight as an arrow, and daylight, appearing like a small star, can be seen from the furthermost point of the boring. The bottom of the Combination shaft is 1500 ft. from the surface, and the blasts in the tunnel "header" can be distinctly heard by the miners in the shaft. After this shaft shall have been reached, which will be in October, there will still remain to be bored about 1500 ft. more, in order to connect with all the different shafts in the Comstock Lode, and this Mr. Sutro expects to accomplish, and to have his tunnel complete by April, 1878. This will make a total length of nearly 20,000 ft., or almost 4 miles. The work on the tunnel began on Oct. 19, 1869. The funds being limited, there was no machine drilling employed at first, machine drills not being introduced until 1873. In 1869 there were 480 ft. bored: in 1870, 1 190 ft.; in 1871, 915 ft.; in 1872, 815. Machine drills then being introduced the progress increased, there being 1919 ft. bored in 1873, 2689 ft. in 1874, 3728 ft. in 1875, 3870 ft. in 1876, and 2134 ft. in 1877, down to Aug. 1. The monthly average progress is now about 305 ft., and this is taken as the basis on which the completion of the tunnel in April next is predicted, its progress being at a rate considerably in advance of those of the Mont Cenis and St. Gothard Tunnels.

The entire expenditure on the Sutro Tunnel down to Aug. 1 was $2,830,597, and Mr. Sutro estimates that $350,000 more will be required to complete it, while to provide it with a double-track railway and wire-rope transportion, and put it in order for thorough usefulness will take $500,000 more, making the entire expenditure about $3,800,000.

The methods in which the tunnel is to facilitate mining operations are various. The shafts on the Comstock Lode have reached depths varying from 1000 ft. to 2300 ft., and the difficulties of mining have so grown with the increased depth that the cost of pumping water from the mines is at present $2,000,000 to $3,000,000 a year; while the temperature in the deepest portions is 95° to 120°, and the water in some places is as high as 160°. The temperature in the tunnel "header" is 90°, and of the water there 97°. Mining in such circumstances is very expensive, for the miners in most places can work only five minutes at a time, when they have to be relieved. Thus reliefs have to be provided so that three or four men handle a single pick, the miners retiring, when relieved, to cooling places, where compressed air is introduced. As a means of overcoming these difficulties, the approaching completion of the Sutro Tunnel is anxiously anticipated by the whole mining population, and, indeed, by the entire people of the Pacific Coast, whose fortunes are closely bound up in these mines. The tunnel will intersect the mines 1800 ft. below the surface, so that the water to this depth will be drained off by the natural flow through the tunnel, while the current of cool air entering will ascend through the shafts, and is expected so far to cool the atmosphere as to permit a miner to do a fair day's work. A new surface, as it were, will be created on the 1800 ft. level, from which point mining may progress downward with greater facility. The water entering the mines at points above the tunnel level can be utilised as a motor to pump water from beneath, which can be discharged on the tunnel level.

Mining engineers generally hold that the only way to work the Comstock Lode at great depths is by the means of compressed air, which, when discharged in hot places takes up in expanding a large portion of the existing heat. If the point where the compressor is placed is at a temperature of 60°, and 5 cubic feet are compressed into 1 cubic foot, the product will have a temperature of 300°. The compressors are, however, cooled by currents of cold water, and this soon brings the temperature down to the normal rate of 60°. The compressed air is then conveyed in pipes to the hot places in the mine, where the temperature is (say) 110°. Every cubic foot discharged will expand into 5 cubic feet, and take up enough of the heat to reduce the temperature from 110° to a much lower point. In practice, in the cooling places in the Comstock Mines, the temperature is thus reduced to 60° or 70°. The Carson river, flowing near the entrance to the Sutro Tunnel, where it has a considerable fall, will furnish power which is to be utilised in compressing air, which will be sent into all the mines through the tunnel for the purpose not only of cooling but also of propelling machinery. There is much in this air-compressing process of great interest in deep mining in England as well as here.

The tunnel, besides draining and ventilating the mines, is also expected to form the chief highway for bringing out the minerals taken from the Comstock Lode. At present they are hoisted to the surface and carried to stamp mills for reduction located on Carson river, about 20 miles from the mines. The tunnel will furnish cheaper transportation. About 1500 tons per day are now hoisted out of the mines, at a cost of about $3 per ton, or $4500 for hoisting and transportation to the mills. Mr. Sutro estimates that it will not cost over $150 a day to transport these minerals through the tunnel to the mills which will be constructed at its entrance. Virginia City, the mining town over the lode, which contains about 20,000 inhabitants, will then to a considerable extent be transferred to the town of Sutro at the tunnel entrance.

The Comstock Lode produces about one-half of the gold and silver mined in the United States, and its yield for this year is estimated at $36,000,000, about one-half gold and one-half silver. Mr. Sutro is sanguine that the completion of the tunnel will maintain this yield for the next 50 years, one of the chief new sources being the low-grade ores, which it will be possible to make available when mining expenses are reduced to a minimum. It is difficult to estimate the actual amount of these low-grade ores still existing in the Comstock Mines. There are estimated to be 200 miles length of drifts, cross-cuts, and winzes in all these mines, and as rich ores or bonanzas were alone hunted for, the low-grade ores have been left behind in the search for greater fortunes. The estimate is that these low-grade ores will assay $10 to $20 per ton, and as they exist largely in all the mines, their value is variously estimated at from $100,000,000 to $500,000,000. Mining on the Pacific Coast has made enormous fortunes for some, and has infected almost the entire community with a mania for gambling in mining shares. When the low-grade ores are worked the product will become more an object of accurate calculation, and divest the Comstock Mines of the stock gambling that now affects everything connected with them.

The means of revenue of the Tunnel Company are various. A special Act of Congress gives the company a right to collect $2 on every ton of ore which may be extracted from all the mines after the tunnel is completed. This, at the present rate of production, would yield $2000 daily, while the increased mining facilities are expected to enlarge the production. The transportation of the ore, its reduction, and the sale of town lots, on the tract of 5000 acres owned at the tunnel entrance by the company, are also expected to yield revenue. The water flow from the tunnel can also be made available in concentrating ores. The Act of Congress also gives the company all the mines, not previously owned by others, for 2000 ft. on either side of the tunnel, for a length of 7 miles from its entrance. Over a dozen quartz lodes have been cut by the tunnel, assaying $2 to $20 per ton, but no explorations of them have been made.

This unique enterprise, it will thus be seen, promises financial returns commensurate with the outlay, and when the tunnel is completed, and begins its work of draining and ventilating the Comstock Lode, and transporting its rich resources, it will be seen that its opening is likely to be one of the most important industrial events that have yet occurred in the United States.

COVERING AND INSULATING WIRE.—The invention of Mr. E. W. BECKINGSALE, of Newport, Isle of Wight, consists in covering wire with paper or paper pulp, in such a manner that the paper envelope shall form a continuous length without seam or lapping, except at considerable intervals, such as in places where joints in the wire occur. This covering may be applied either to a naked wire or to a wire which is already covered. The purpose of the paper covering is that of protection from injuries of the enclosed wire, or of the enclosed wire and material surrounding it, the injuries to be guarded against being of a mechanical or chemical nature; or the purpose may be for the electrical insulation of the wire, or of the wire and material surrounding it, or for the strengthening of the wire to resist strains.

PARIS INTERNATIONAL EXHIBITION, 1867.

VIENNA INTERNATIONAL EXHIBITION, 1873.

LONDON INTERNATIONAL EXHIBITION, 1874.

CORNWALL POLYTECHNIC SOCIETY, 1867 and 1873.

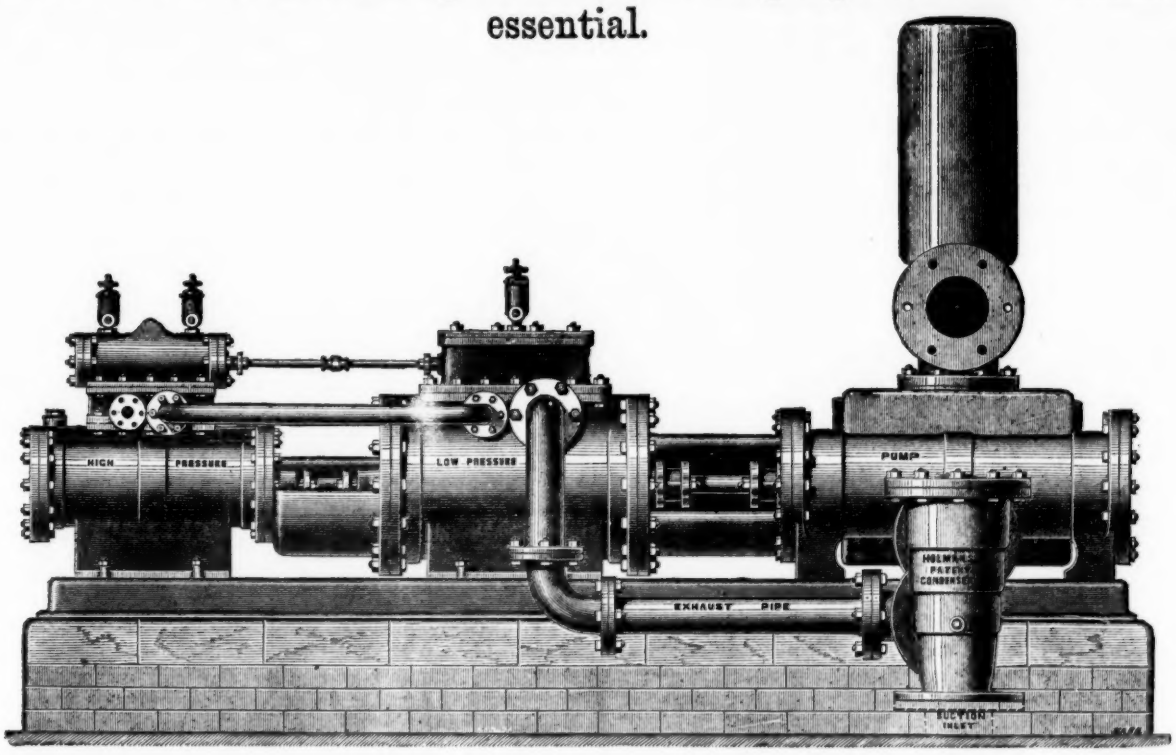
TANGYE BROTHERS AND HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.,

AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

THE "SPECIAL" DIRECT-ACTING COMPOUND STEAM PUMPING ENGINE,

For use in Mines, Water Works, Sewage Works, and all purposes where Economy of Fuel is essential.



After several years of successful application for all purposes to which steam-driven pumps can be applied, THE "SPECIAL" STEAM PUMP STILL MAINTAINS THE FIRST POSITION IN THE MARKET, notwithstanding that it alone—of all direct-acting pumps—has been subjected to the great variety of severe tests that must be encountered in such a period of time. Some valuable improvements have been suggested in the course of a long experience, and their adoption has rendered the apparatus at once

THE SIMPLEST AND MOST CERTAIN IN ACTION.

The illustration shows an extension of the principle of this Pump to a Compound Steam Pumping Engine, by which the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere. The Engine combines simplicity, certainty of action, great compactness, fewness of parts, and consequent reduction in wear and tear.

Several thousands of the "Special" Steam Pumping Engines, with high-pressure cylinders only, are in use in British and Foreign Mines, Water Works, &c.,—and for confined situations, or where Engines of a comparatively small size only are necessary, they will still meet all requirements—but their application will be very largely increased, since it has been found practicable to embrace the important features of expanding and condensing the steam, so that increased power may be obtained, and the consumption of fuel greatly economised.

THE "SPECIAL" DIRECT-ACTING COMPOUND STEAM PUMPING ENGINE is the most simple appliance for deep mine draining and general purposes of pumping ever practically developed, and the first cost is very moderate compared with the method of raising water from great depths by a series of 40 to 50 fathom lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pit-work are required, while they allow a clear shaft for hauling purposes.

SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder.....In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder .....In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder .....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke .....In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate	3900	6100	8800	6100	8800	12.000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Diameter Suction and Delivery .....In.	3	3½	4	3½	4	5	6	4	5	6	8	5	6	8	9
Diameter High-pressure Steam Inlet.....In.	1¼	1¼	1¼	1½	1½	1½	1½	2¼	2¼	2¼	2¼	2¼	2¼	2¼	2¼
Diameter Low-pressure Steam Exhaust.....In.	1½	1½	1½	1¾	1¾	1¾	1¾	2½	2½	2½	2½	2½	2½	2½	2½
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder } Non-condensing...	360	330	160	360	250	184	140	360	264	202	130	360	275	175	123
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	293	203

CONTINUED.

Diameter of High-pressure Cylinder .....In.	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30
Ditto of Low-pressure Cylinder .....In.	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52
Ditto of Water Cylinder .....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	12
Length of stroke .....In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050	35,225
Diameter Suction and Delivery .....In.	6	8	9	10	6	8	9	10	8	9	10	8	9	10	9
Diameter High-pressure Steam Inlet .....In.	2½	2½	2½	2½	3	3	3	3	3½	3½	3½	4	4	4	5½
Diameter Low-pressure Steam Exhaust.....In.	3	2	3	3	3½	3½	3½	3½	4	4	4	5	5	5	6½
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder } Non-condensing..	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

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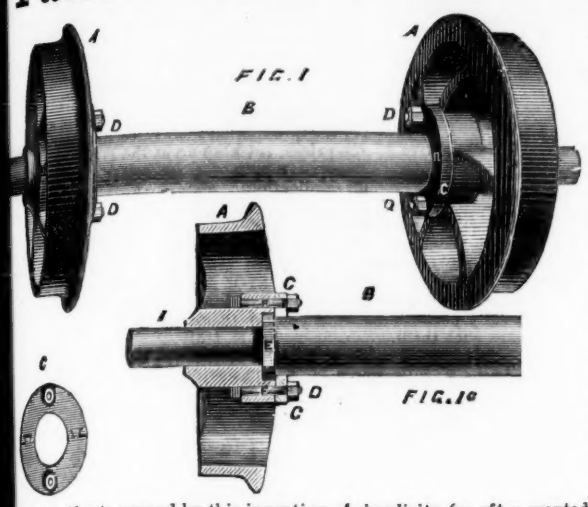
CRUCIBLE CAST STEEL CASTINGS,

HAVE PLEASURE IN CALLING THE ATTENTION OF THE MINING WORLD TO THEIR

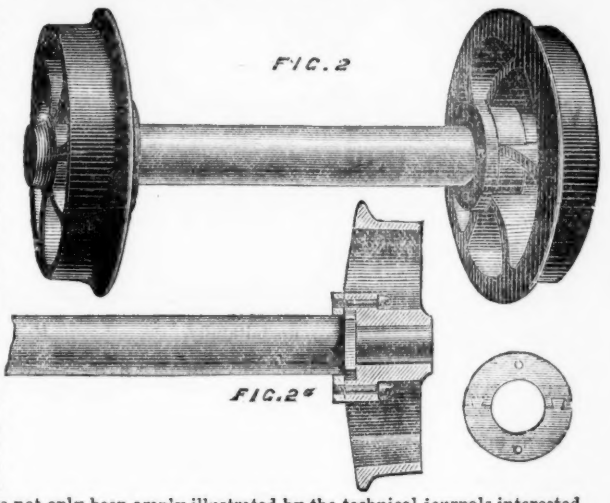
Patent Method of Fitting up Cast Steel Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of corf wheels and axles fitted up for outside bearings. A A, are the wheels; B, is the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle. Figs. 2 and 2a show a longitudinal view and plan of a pair of corf wheels fitted up for inside bearings. The washers are secured to the boss of the wheel in outside bearings by bolts and nuts, and in inside bearings by set screws.

The advantages of the above system are:—A, the singular simplicity of fitting—enabling any inexperienced person, with the aid of a spanner or screw-driver, to detach the wheels from the axle or fit them together in a very short time. B, perfect solidity, the wheels and axles becoming as one piece. C, durability, no need or putting the wheels or axles into the fire, under any circumstances, which is so detrimental to wheels, rendering them remarkably brittle, and which under other systems are detached from the axle by the aid of fire. D, economy in fuel and wages, saving hundreds of pounds yearly to large coal owners. The



important desiderata secured by this invention of simplicity (so often wanted in patents), solidity, durability, and economy, have not only been amply illustrated by the technical journals interested the progress of mining operations in this country, but have at once been fully recognised by leading authorities in the mining world.

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Engines of the most approved class for driving.
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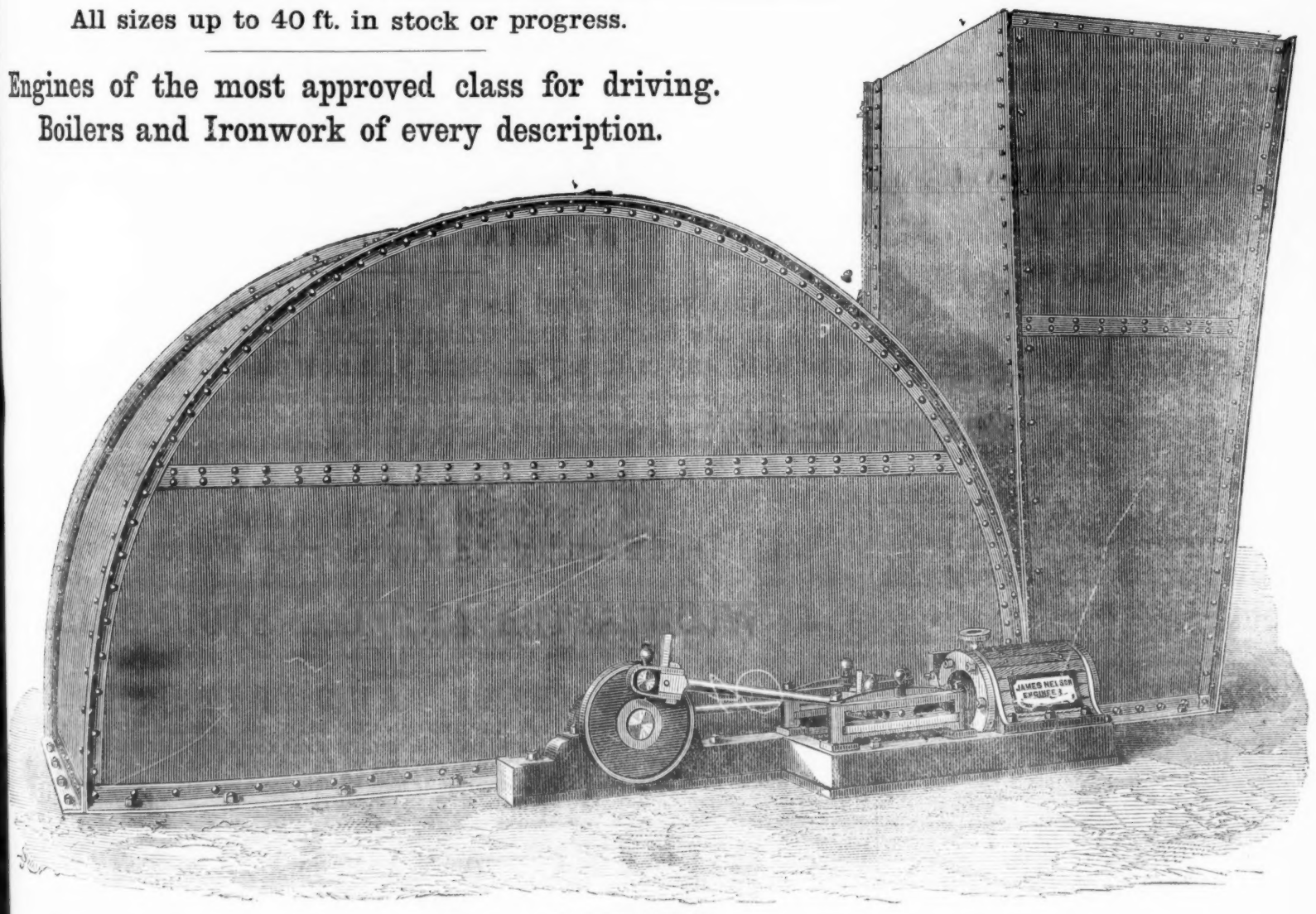

MANUFACTURED BY

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GATESHEAD-ON-TYNE.

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